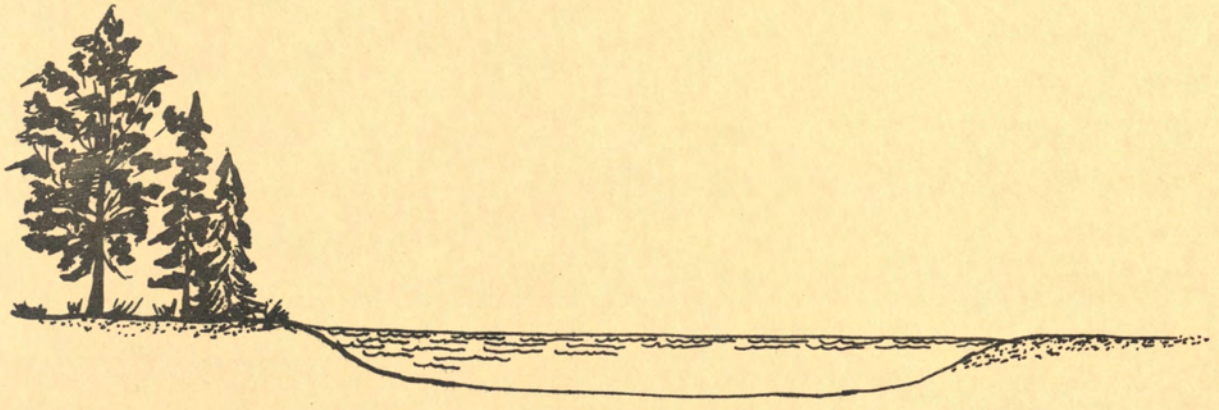

WATER SUPPLY PLAN

for the

SOUTHEASTERN CONNECTICUT

PLANNING REGION

1977

WATER SUPPLY PLAN
FOR THE
SOUTHEASTERN CONNECTICUT PLANNING REGION

Projects CPA-CT-01-00-1045 and CT-01-00-1058

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SOUTHEASTERN CONNECTICUT REGIONAL PLANNING AGENCY
139 Boswell Avenue, Norwich, Connecticut

September, 1977

ABSTRACT OF REPORT

1.	Title:	*Water Supply Plan for the Southeastern Connecticut Planning Region.*
2.	Author:	Southeastern Connecticut Regional Planning Agency, 139 Boswell Avenue, Norwich, Connecticut 06360.
3.	Subject:	A regional water supply plan.
4.	Date:	September, 1977.
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9.	No. of Pages:	53.
10.	Abstract:	The plan presents current and anticipated regional water supply demands through 1985. Additional water supply alternatives are examined and major recommendations are presented.

SOUTHEASTERN CONNECTICUT REGIONAL PLANNING AGENCY

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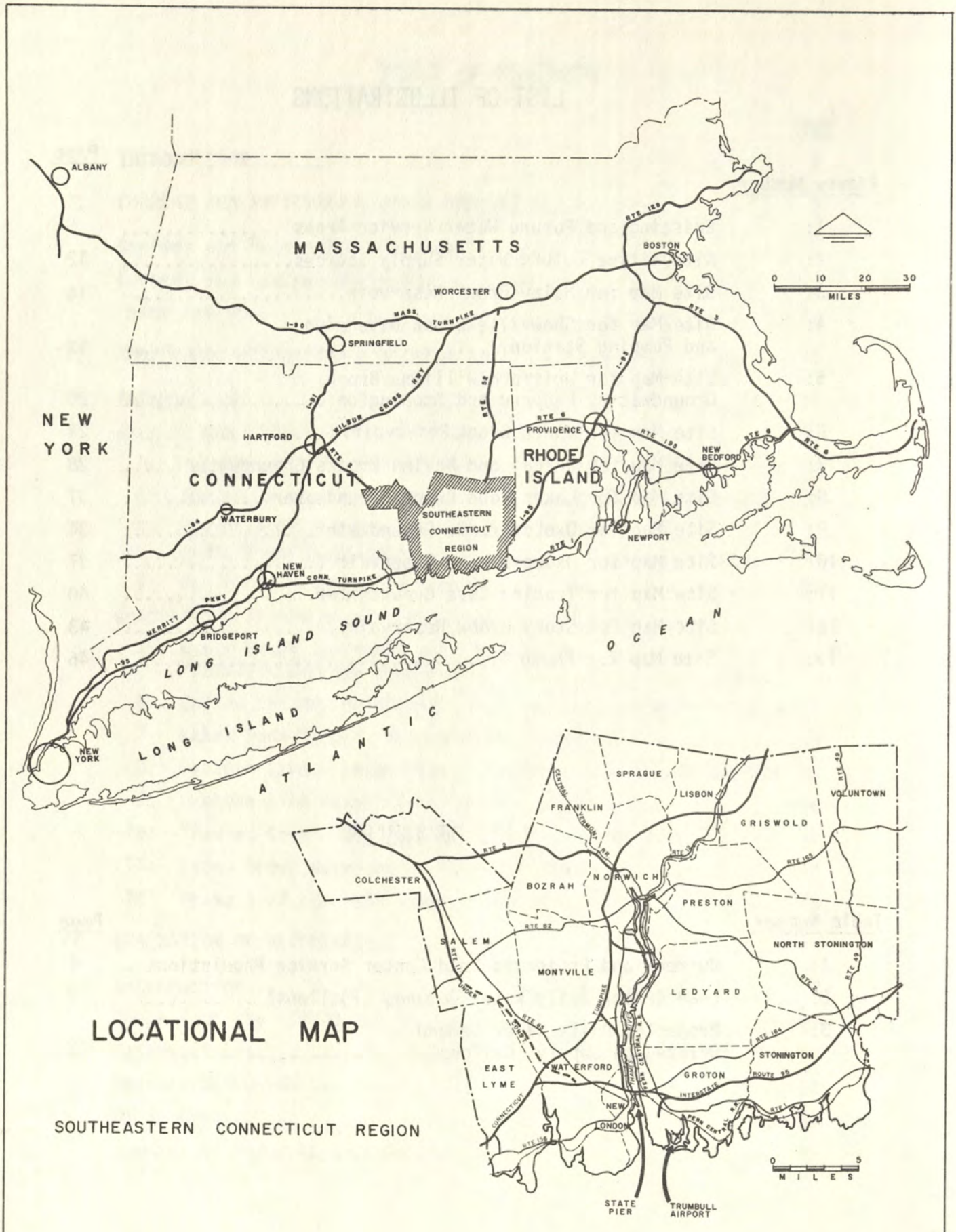


LOCATIONAL MAP

SOUTHEASTERN CONNECTICUT REGION

SCRPA 1973

I. INTRODUCTION

In 1970 SCRPA in cooperation with the Southeastern Connecticut Water Authority (SCWA) and the major water utilities of Southeastern Connecticut prepared a recommended Water Supply Plan for the Southeastern Connecticut Region. That plan responded to Public Act 381 of the 1967 Session of the Connecticut General Assembly, which established SCWA. The plan examined long-range water supply needs throughout the region and proposed a phased program to meet these through the year 2020.

For several reasons, the 1970 Water Supply Plan has become outdated. A major factor has been the fact that Phase I of the plan has not been implemented. This, in effect, means that the region has not committed itself to a regional approach to meeting future water supply needs. Other factors contributing to the need for re-evaluating the 1970 plan include: a slowing in the rate of Southeastern Connecticut's population growth, stabilization of the per capita demand for water, completion of an updated Regional Development Plan in 1976, new drinking water standards under the Safe Drinking Water Act of 1974, the availability of more detailed information on potential water supplies, growing concern over energy use, and inflation.

The 1976 Regional Development Plan recommendations for future land use were based upon natural resource information, existing development, current and planned transportation systems, existing and proposed sewer service areas, and local plans and comments. The Plan's highest density land use categories are used in Chapter II of this report to update the water service areas.

The 1974 Safe Drinking Water Act is intended to establish national uniform standards for drinking water. In Connecticut implementation responsibility rests with the State Department of Health, with detailed specifications enumerated in Section 19-13-B102 of the Connecticut Public Health Code. This Section sets standards for treatment and testing, lists treatment techniques, and describes required surveys and reports. Provisions are made for granting variances or exceptions provided this doesn't result in an unreasonable risk to health. An exemption may be granted until January 1, 1981 or for a public system which has entered into an agreement to become part of a regional system until January 1, 1983. There is also a requirement for public notification if a system fails to comply with the standards.

After discussion with SCWA and representatives of major water utilities, it became clear that the real concern was what alternatives existed to meet anticipated water supply needs over the short-run rather than the design of a long-range program. In an effort to respond, the updating of the Regional Water Supply Plan focuses on expected needs in 1985.

This study draws heavily on technical information from a variety of previous engineering studies conducted by or for SCWA and local water utilities. Data have also been provided from studies of the U.S. Geological Survey. And the Connecticut Department of Health has contributed its advice. The several water utilities in the area have been generous in providing data, and representatives of several

utilities have served on a Technical Advisory Committee* to the study.

The report which follows is a planning study that examines expected water supply needs in different parts of the region, inventories and comments on ways of meeting these needs, and suggests several possible courses of action for further exploration. This study does not examine and inventory each of the approximately 75 water utilities in the Region for plant, distribution and storage details as Volume I of the 1970 Water Supply Plan did.

* The Committee members were: East Lyme - Kenneth Monat, Engineer, East Lyme Water Department; City of Groton - William Clinton, General Manager, City of Groton Utilities; City of New London - Gordon Beckwith, Superintendent of Water Maintenance; City of Norwich - Richard DesRoches, Water and Sewer Division Manager, Norwich Department of Public Utilities (replaced in August by new Water and Sewer Manager Gregory Kuchy); Southeastern Connecticut Water Authority - Shepard Palmer, Authority Chairman and Douglas Crandall, Authority Manager; Southeastern Connecticut Regional Planning Agency - Edward Tregger, Chairman, Betty Cochran, Secretary, William Morgan, Agency member, and Richard Wallace, Chairman, Sprague Water and Sewer Authority and Agency member.

II. CURRENT AND ANTICIPATED WATER DEMANDS

CURRENT AND FUTURE SERVICE AREAS

Current and future water service areas were first delineated in the 1970 Regional Water Supply Plan developed by SCWA and SCRPA. To calculate future water demands, the area of the region to be served was divided into "load centers" based on the 1967 Regional Development Plan, current or future service areas, and elevation characteristics.

In the current update of the regional water supply plan, the load centers were changed to reflect: additions to water systems, the 1976 Regional Development Plan mixed urban and economic center categories, local plans, and land use or zoning. These updated load centers, along with areas presently served by public or community water supplies, are shown on Figure 1. As in the 1970 plan, the letters and numbers in each load center serve to describe the load center. The first two letters identify the geographic location, lower-case letters "i" and "h" are added to some load center designations to indicate water pressure characteristics. Those load centers having no lower-case letter suffix are at elevations generally below 200 feet. They may be referred to as "low service" areas. The suffix "i" stands for an "intermediate-service" area, or one that cannot be served by the same pressures available in a low-service area. Elevations range generally from 200 to 400 feet. One "h" suffix appears on the load center map (MV-4h), indicating a "high-service" area whose elevations range to about 200 feet above the adjacent intermediate service area (MV-3i). Generally, the highest elevation in any service area is no more than 200 feet above the lowest elevation.

CURRENT AND FUTURE POPULATION

Total population currently residing in the load centers was determined from the 1970 Census data for block groups and enumeration districts and from 1975 aerial photographs. Figures for persons-per-housing unit varied from load center to load center, based upon census tract data. These figures were used in conjunction with the air photos to determine the number of persons occupying housing constructed since 1970.

Projections to the year 1985 were made based on the 1970-75 rate of growth for each town and extrapolated to 1985. 1975 total town populations were based on State Health Department estimates. Not all of the persons residing within a load center will be connected to a public or community water system. Table 1 indicates the load center population served in 1975, and the population estimated to be served by a public or community water service in 1985.

WATER DEMAND

Southeastern Connecticut's future water needs were estimated on the basis of present water production and consumption, projected population growth, and projected consumption rates for residential and other types of land uses.

1975 residential water consumption was approximately 55 gallons per capita per day (gpcd). In 1975 there were approximately 187,375 persons residing in the

TABLE 1

CURRENT AND PROJECTED LOAD CENTER SERVICE POPULATIONS

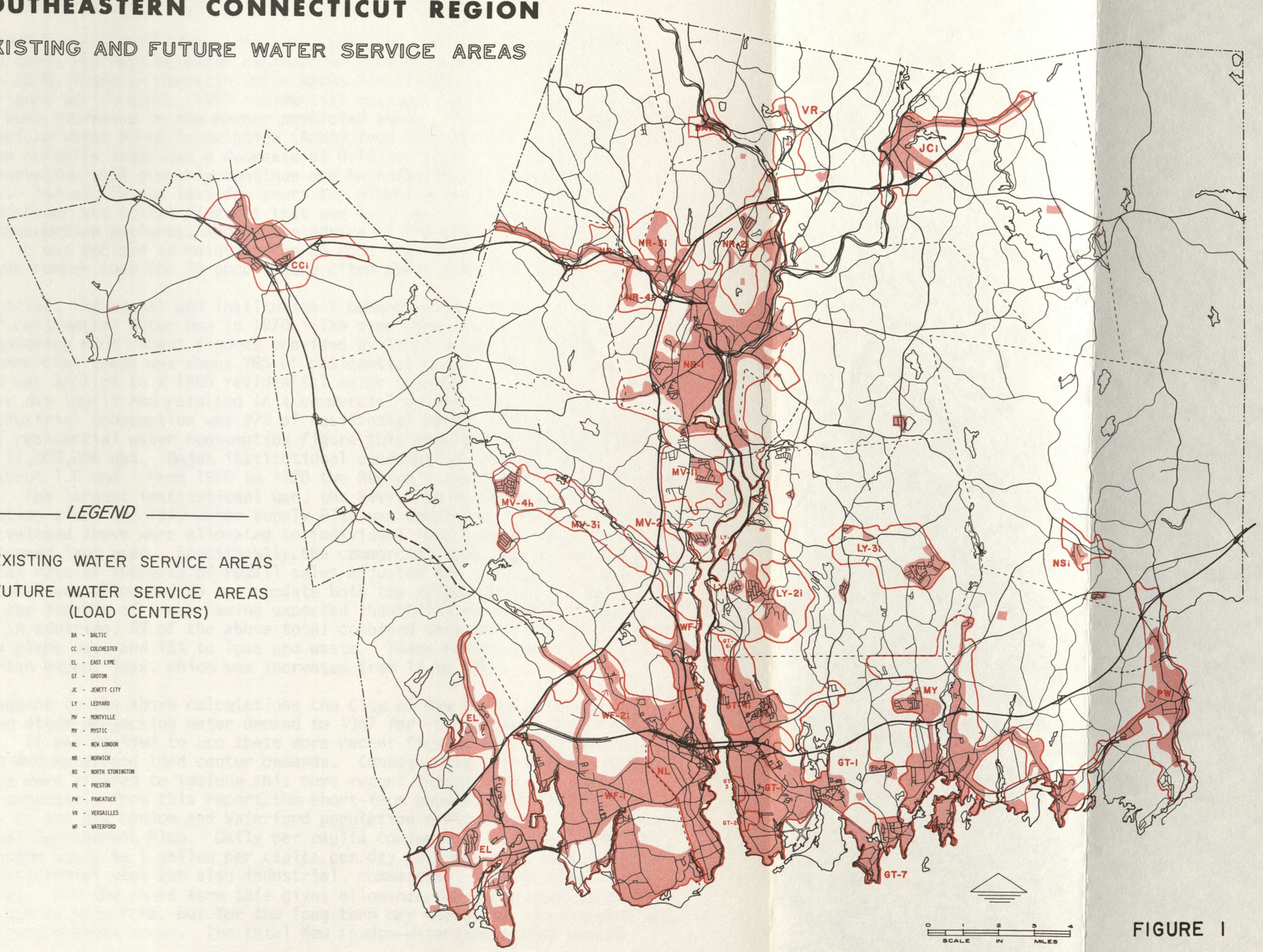
	Load Center	1975 Service Population	Projected 1985 Service Population
CCi	Colchester	3,830	4,755
BAi	Baltic	1,000	1,120
VR	Versailles	170	540
JCi	Jewett City	5,360	6,100
PR	Preston-Route 2	0	10
NR-1	Downtown Norwich-West Side-Taftville	37,925	42,930
NR-2i	Mohegan Park-Canterbury Turnpike	3,750	4,480
NR-3i	Bean Hill-Industrial Park	185	210
NR-4i	Wawecus Hill	900	1,015
NR5	Norwichtown-Yantic-Fitchville	1,375	1,555
MV-1i	Route 32	1,105	4,710
MV-2	Uncasville	605	3,870
MV-3i	Oxoboxo Valley	70	580
MV-4h	Montville Manor-Oakdale	2,465	2,635
NSi	North Stonington-Kingswood	780	940
WF-1	Waterford Center, Great Neck, Oswegatchie	6,565	14,610*
WF-2i	Cohanzie-Route 52	485	1,080*
WF-3	Quaker Hill	1,055	2,345*
NL	New London	31,745	33,125*
EL	East Lyme	10,380	13,120
LY-1	Gales Ferry	315	3,170
LY-2i	Christy Hill	2,060	2,535
LY-3i	Ledyard Center-Highlands	2,860	3,585
LY-4	Dow Chemical	Major Industry	
GT-1	City and Town of Groton	19,710	19,710
GT-2	Charles Pfizer	Major Industry	
GT-3	General Dynamics	Major Industry	
GT-4i	Route 12-Northwest	7,770	7,770
GT-5	U.S. Navy	Major Industry	
GT-6i	U.S. Navy	Major Industry	
GT-7	Groton Long Point-Noank	2,460	2,460
MY	Mystic-Stonington Borough	12,220	12,945
PW	Pawcatuck	6,695	7,420
TOTAL:		163,840	199,325

* Fay, Spofford and Thorndike, City of New London, Connecticut, Report on Water Supply, May, 1977.

SOURCE: SCRPA survey of water utilities and projections.

SOUTHEASTERN CONNECTICUT REGION

EXISTING AND FUTURE WATER SERVICE AREAS



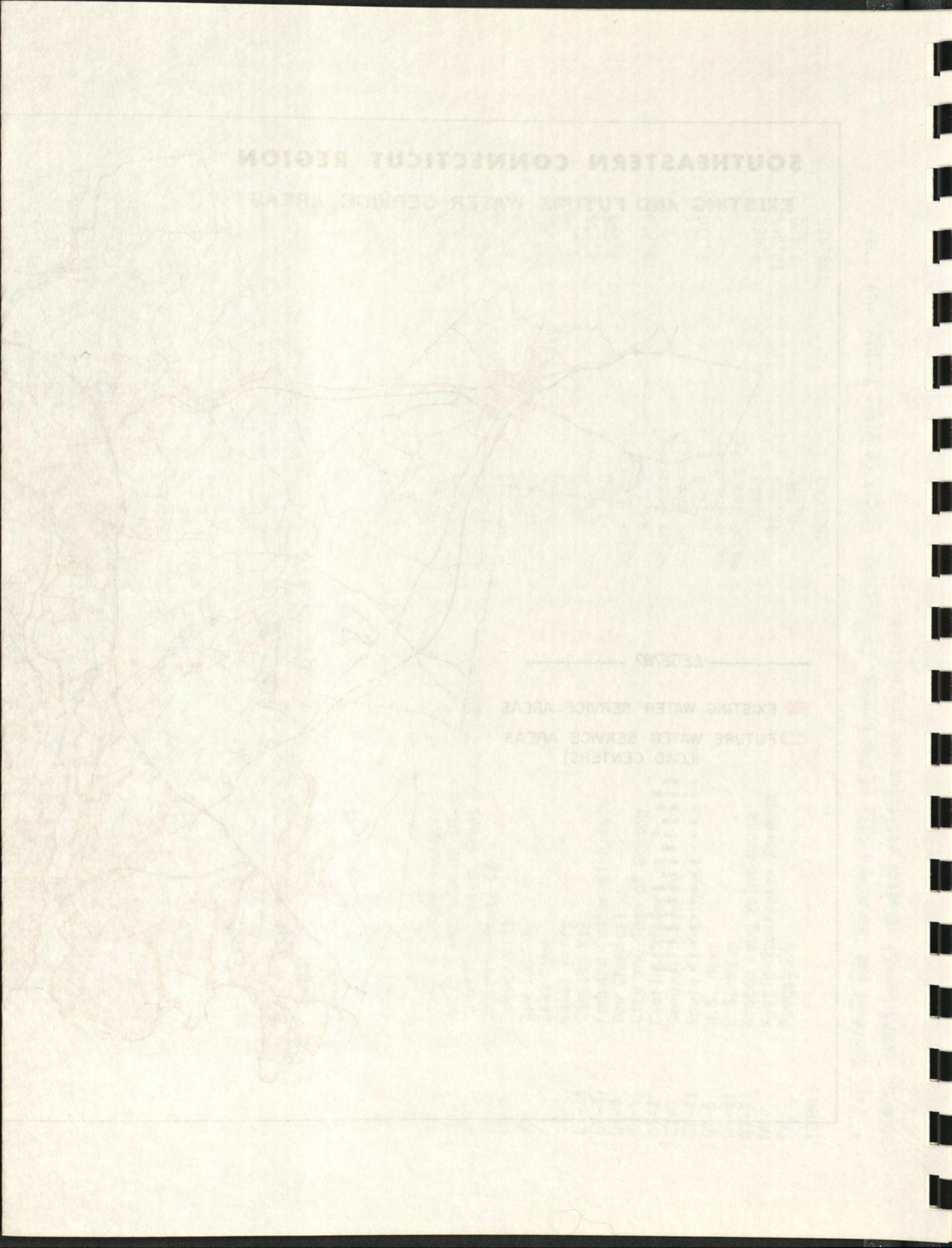
LEGEND

EXISTING WATER SERVICE AREAS

FUTURE WATER SERVICE AREAS (LOAD CENTERS)

BA - BALTIC
CC - COLCHESTER
EL - EAST LYME
GT - GROTON
JC - JEWETT CITY
LY - LEDYARD
MV - MONTVILLE
MY - MYSTIC
NL - NEW LONDON
NR - NORWICH
NS - NORTH STONINGTON
PR - PRESTON
PW - PAWCATUCK
VR - VERSAILLES
WF - WATERFORD

FIGURE 1



load centers, of which approximately 164,000 were estimated to be served by public or community systems. 1975 residential use was about 9.5 million gallons per day (mgd), exclusive of those homes on individual wells.

The 1970 Water Supply Plan indicated a straight line increase in average per capita daily residential water consumption from 60 gallons in 1970 to 101 gallons in 2020, based on American Water Works Association data. This meant the 1985 figure was 73 gpcd. 1975 residential consumption per capita does not appear to have increased in the manner predicted above. A study of 20 utilities by the American Water Works Association (AWWA) from 1970 to 1974 for residential consumption actually indicated a decrease of 0.1% per year. The emphasis on water conservation will probably continue and be reflected in future rate structures. Indeed, in the last few years the plumbing industry has actually introduced shower and toilet fixtures that use less water. Because of these changing consumption patterns, and on the advice of the study technical advisory committee, it was decided to maintain the 55 gpcd figure for 1985 residential calculations rather than the 73 gpcd figure cited above from the 1970 plan.

Commercial, industrial and institutional demands were calculated as a percentage of residential water use in 1970. The same approach is used in this update, employing more recent figures provided by local water utilities. In 1975-76 commercial usage was about 28% of residential usage. This 1975-76 percentage was applied to a 1985 residential water consumption figure of 11,307,680 gallons per day (gpd)* and resulted in a commercial demand of 3,116,065 gpd. 1975-76 industrial consumption was 97% of residential usage. When applied to the above 1985 residential water consumption figure this resulted in an industrial demand of 11,005,860 gpd. Major institutional consumption was held at the 1975 level of about 1.5 mgd. From 1960 to 1970 the Region's institutional population decreased. The largest institutional use, the Navy, has remained about constant in consumption since the 1970 Water Supply Plan was completed. The total regional figures developed above were allocated to individual load centers based on existing and planned land uses. Specifically, the commercial total was allocated based on the local rate of increase of retail sales adjusted for inflation. The industrial total was allocated to accommodate both the future demands of existing firms and the demands of areas having expected industrial development potential by 1985. In addition, 5% of the above total combined uses was allotted to public use, 5% to plant use, and 15% to loss and waste. These ratios are the same as the 1970 Plan except loss, which was increased from 12 to 15%.

Subsequent to the above calculations the City of New London completed an engineering study projecting water demand to 1987 for its system, which includes Waterford. It was decided to use these more recent figures for the short-term New London and Waterford load center demands. Consequently, the demands calculated above were altered to include this more recent information. Although developed separately from this report, the short-term population estimates are very close to the New London and Waterford population estimates developed for the Regional Development Plan. Daily per capita consumption was increased in the New London Study by 1 gallon per capita per day per year, but this included not only residential uses but also industrial, commercial, institutional, and governmental. For the short term this gives allowance for other uses in a growing area such as Waterford, but for the long term may change as conservation and rate structure changes occur. The total New London-Waterford system demand

* This excludes water provided by private, on-lot wells.

includes a 30 percent allowance for unaccounted for usage. Projected 1987 demand was metered usage at 5.67 mgd and unaccounted for usage at 2.43 mgd.

1985 total water demands for each load center are shown in Table 2. These demands are compared with the yields of existing water systems in Table 3. These projections should only be considered as best approximations subject to change. For instance, industrial demands vary from one industry to another, and the location of one major user in the region would alter the industrial projections. Fortunately, an error in future water demands simply makes nearer or further the point in time when additional supplies are needed. This argues for a good regional monitoring system to keep track of the types of consumption on a yearly basis and the yearly totals. Then as a system begins to reach its safe yield, alternatives could be developed for cooperation, tie-ins, sharing, emergencies and new supplies. The logical choice for this regional monitoring system is the SCWA.

The total projected 1985 demand or need is lower by about 30% than that projected in the 1970 Regional Water Supply Plan, reflecting the reduced rate of population growth in the region and anticipated stabilization of rates of water consumption.

The Groton and New London systems have the largest projected demands, with local estimates at about 2 mgd additional supply being needed for each system. The Colchester and Montville areas (Route 32 and Uncasville) will have lesser needs of about 75,000 and 450,000 gpd respectively. East Lyme and Norwich have the greatest projected surpluses at about 2 mgd each in 1985. The above figures were developed exclusive of peak demands, which should be addressed in any engineering studies conducted.

Although the total current safe yield is greater than the projected demand, some of the individual excess quantities are small and are not always located where they are needed. For example, a 100,000 gpd surplus in Sprague or Griswold is really of no use to New London or Groton in their search for new supplies. Thus alternatives to augment the present supplies of several communities must be explored.

TABLE 2

LOAD CENTER DAILY WATER DEMANDS* (Gallons)

	Load Center	1975 Total	Projected 1985 Total
CCi	Colchester	334,750	411,315
BAi	Baltic	81,000	107,000
VR	Versailles	29,190	55,875
JCi	Jewett City	710,600	888,595
PR	Preston-Route 2	0	3,815
NR-1	Downtown Norwich-West Side-Taftville	3,487,050	4,037,640
NR-2i	Mohegan Park-Canterbury Turnpike	247,500	308,000
NR-3i	Bean Hill-Industrial Park	612,210	951,940
NR-4i	Wawecus Hill	59,400	69,780
NR5	Norwichtown-Yantic-Fitchville	198,750	251,805
MV-1i	Route 32	87,175	347,245
MV-2	Uncasville	273,550	562,480
MV-3i	Oxoboxo Valley	7,750	42,085
MV-4h	Montville Manor-Oakdale	164,975	181,155
NSi	North Stonington-Kingswood	43,800	65,875
WF-1	Waterford Center, Great Neck, Oswegatchie	1,458,635	2,938,075
WF-2i	Cohanzie-Route 52	76,220	119,120
WF-3	Quaker Hill	165,145	258,090
NL	New London	3,441,670	4,575,480
EL	East Lyme	771,560	1,369,185
LY-1	Gales Ferry	106,275	296,880
LY-2i	Christy Hill	121,200	174,280
LY-3i	Ledyard Center-Highlands	191,050	276,420
LY-4	Dow Chemical	7,000	8,750
GT-1	City and Town of Groton	1,860,600	2,357,000
GT-2	Charles Pfizer	5,683,000	8,169,315
GT-3	General Dynamics	1,125,000	1,617,190
GT-4i	Route 12-Northwest	464,800	581,000
GT-5	U.S. Navy	1,000,000	1,250,000
GT-6i	U.S. Navy		
GT-7	Groton Long Point-Noank	198,000	224,770
MY	Mystic-Stonington Borough	1,188,870	1,568,140
PW	Pawcatuck	513,225	639,125
TOTAL:		24,709,950	34,707,425

* Excludes water demands met by private on-lot wells.

SOURCE: SCRPA survey of water utilities and projections.

TABLE 3

PROJECTED DAILY WATER DEMAND RELATED TO SUPPLY

(Gallons)

Load Center	1975 Demand	1985 Demand	Current Safe Yield	Anticipated 1985 Water Supply Surplus or (Deficit)
CCi (Colchester)	334,750	411,315	357,000	(54,315)
BAi (Baltic)	81,000	107,000	210,000	103,000
VR (Versailles)	29,190	55,875	270,000	214,125
JCi (Jewett City)	710,600	888,595	1,030,000	141,405
NR & PR (Norwich and Preston along Route 2)	4,604,910	5,622,980	8,000,000	2,377,020
MV1&2 (Montville - east of Route 52)	360,725	909,725	451,575	(458,150)
MV3&4 (Oxoboxo Valley - Montville Manor-Oakdale)	172,725	223,240	453,400	230,160
LY1&2 (Gales Ferry-Christy Hill)	227,475	471,160	474,505	3,345
LY3 (Ledyard Center-Highlands)	191,050	276,420	327,000	50,580
LY4 (Dow Chemical)	7,000	8,750	500,000	491,250
NS (North Stonington-Kingswood)	43,800	65,875	140,000	74,125
EL (East Lyme)	771,560	1,369,185	3,500,000	2,130,815
NL & WF (New London and Waterford)	5,141,670	7,890,765*	5,925,725**	(1,965,040)
GT (Groton)	10,331,400	14,199,275	12,100,000	(2,099,275)
MY (Mystic-Stonington Borough)	1,188,870	1,568,140	2,200,000	631,860
PW (Pawcatuck)	513,225	639,125	600,000	(39,125)
Total:	24,709,950	34,707,425	36,539,205	1,831,780

* Includes a 30% allowance for unaccounted for usage.
** The balance of New London's 6.13 mgd safe yield is included in MV1&2 safe yield.

SOURCE: SCRPA survey of water utilities and projections.

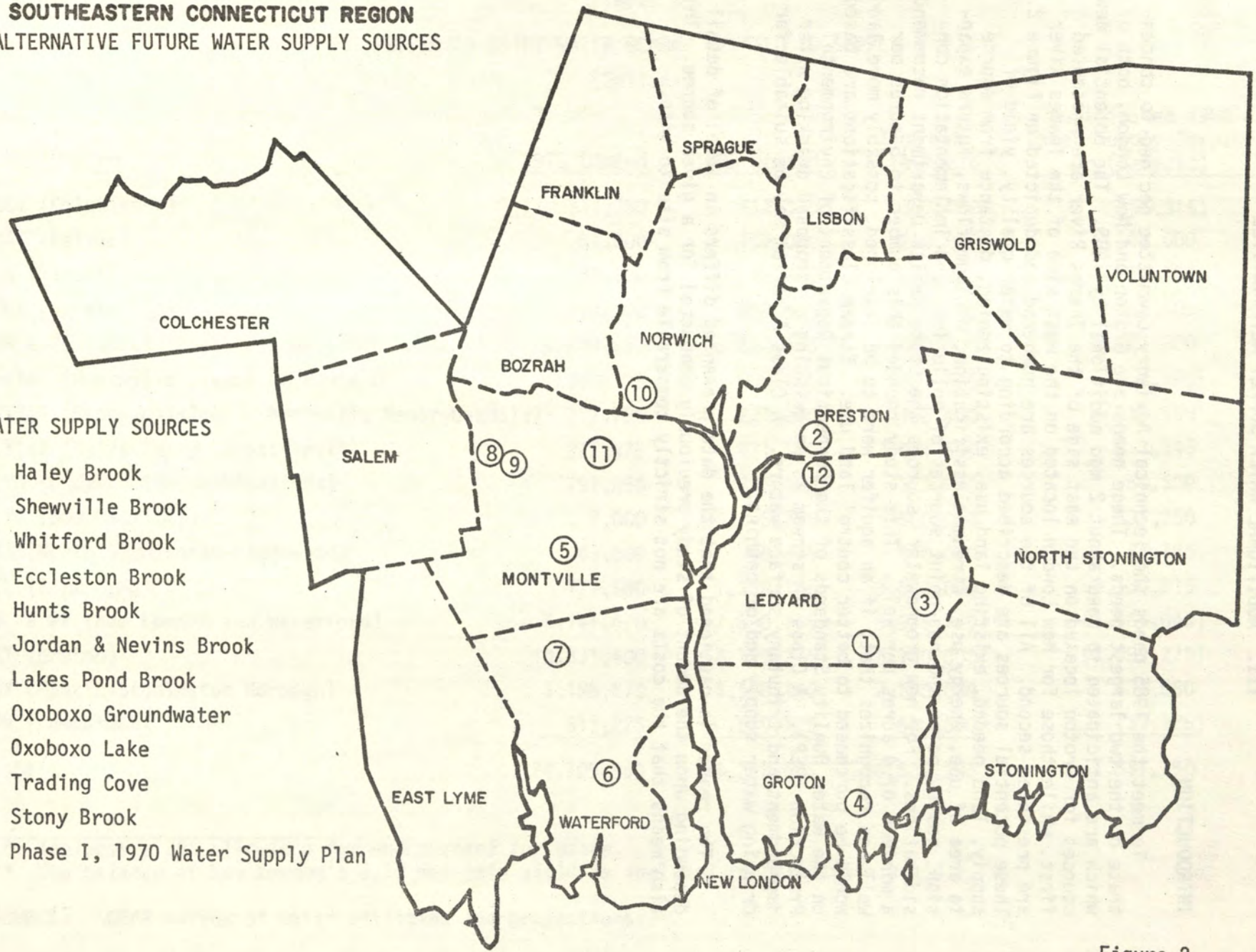
III. ADDITIONAL WATER SUPPLY ALTERNATIVES

INTRODUCTION

To meet the 1985 needs the Technical Advisory Committee decided to concentrate on the two largest needs. These needs are Groton and New London, both of which are anticipated to need about 2 mgd additional by 1985. The potential new sources for Groton located on the east side of the Thames River are presented first, while those for New London located on the west side of the Thames River are presented second. All of the sources are numbered and depicted on Figure 2. These potential sources are described according to water quality, yield of supply, land needed, existing land use, existing zoning, distance from source to area of use, energy use, stream classification, minimum flows, future expansion, costs, point and non-point sources of pollution, and implementation considerations. For new groundwater sources the State Health Department recommends a minimum of 4 acres per well. This study rounded this number to 5 acres per well and recognizes that, if an aquifer were to be developed, possibly more land would be purchased to better control land use. Stream Classifications are based on the Water Quality Standards of the Connecticut Department of Environmental Protection (DEP). A Class AA stream is an existing or proposed drinking water impoundment and tributary surface waters. A Class A stream may be suitable for drinking water supply and/or bathing.

The reader is cautioned that the data presented differs in level of detail depending upon the amount of study previously conducted for a given source. This also means that the costs are not strictly comparable from site to site.

SOUTHEASTERN CONNECTICUT REGION
ALTERNATIVE FUTURE WATER SUPPLY SOURCES



WATER SUPPLY SOURCES

1 Haley Brook
2 Shewville Brook
3 Whitford Brook
4 Eccleston Brook
5 Hunts Brook
6 Jordan & Nevins Brook
7 Lakes Pond Brook
8 Oxoboxo Groundwater
9 Oxoboxo Lake
10 Trading Cove
11 Stony Brook
12 Phase I, 1970 Water Supply Plan

Figure 2

EAST OF THE THAMES RIVER, POTENTIAL NEW SOURCES

1: HALEY BROOK IMPOUNDMENT AND DIVERSION: SURFACE, LEDYARD & GROTON

Reference Sources:
1. Feasibility Report on the Development of the Haley Brook Watershed, Prepared by Lenard Engineering for the City of Groton, 1974.
2. SCRPA data.
3. Blonder Property, Ledyard, Connecticut, ERT report. Eastern Connecticut RC&D Area, June, 1976.
4. Water Quality Standards, DEP, 1976.

Discussion and Evaluation

1. Project Description: Reference 1.
A dam with a spillway at an elevation of 198 feet would be constructed on Haley Brook 120 feet south of the Ledyard town line in Groton. (See Figure 3.)

2. Quality of Water: Reference 1.
Untreated water would be pumped from the new impoundment to Morgan Pond in the City of Groton reservoir system. Treatment would be provided by the existing City of Groton plant. (See #9.)

3. Yield of Supply: References 1 and 2.
1.8 million gallons per day (mgd). The City of Groton indicates that the storage capacity of Morgan Pond would have to be increased to utilize this yield.

4. Land Needed: References 1 and 2.
28 acres flooded.
156 acres for setbacks around flooded area and tributary watercourses.
Right-of-way for pipeline 20' x 5,000'.
Right-of-way for open channel 20' x 4,500'.

5. Existing Land Use: References 2 and 3.
   A. Residential - none.
   B. Institutional - approximately 600 feet of Lambtown Road within the buffer area.
   C. Recreational-Open Space.
   The Blonder Property owned by Town of Ledyard is within the Haley Brook watershed about 1,100 feet upstream of the proposed impoundment.

6. Existing Zoning: Reference 2.
R-60 (residential with a minimum lot size of 60,000 square feet) over the entire watershed, except for a small area of R-40 along Colonel Ledyard Highway.

7. Distance from Area of Source to Area of Use: Reference 1.
From the proposed impoundment to Morgan Pond is approximately 9,500 feet. 5,000 feet would require a 30-inch pipe transmission main; 4,500 feet would be an open channel.

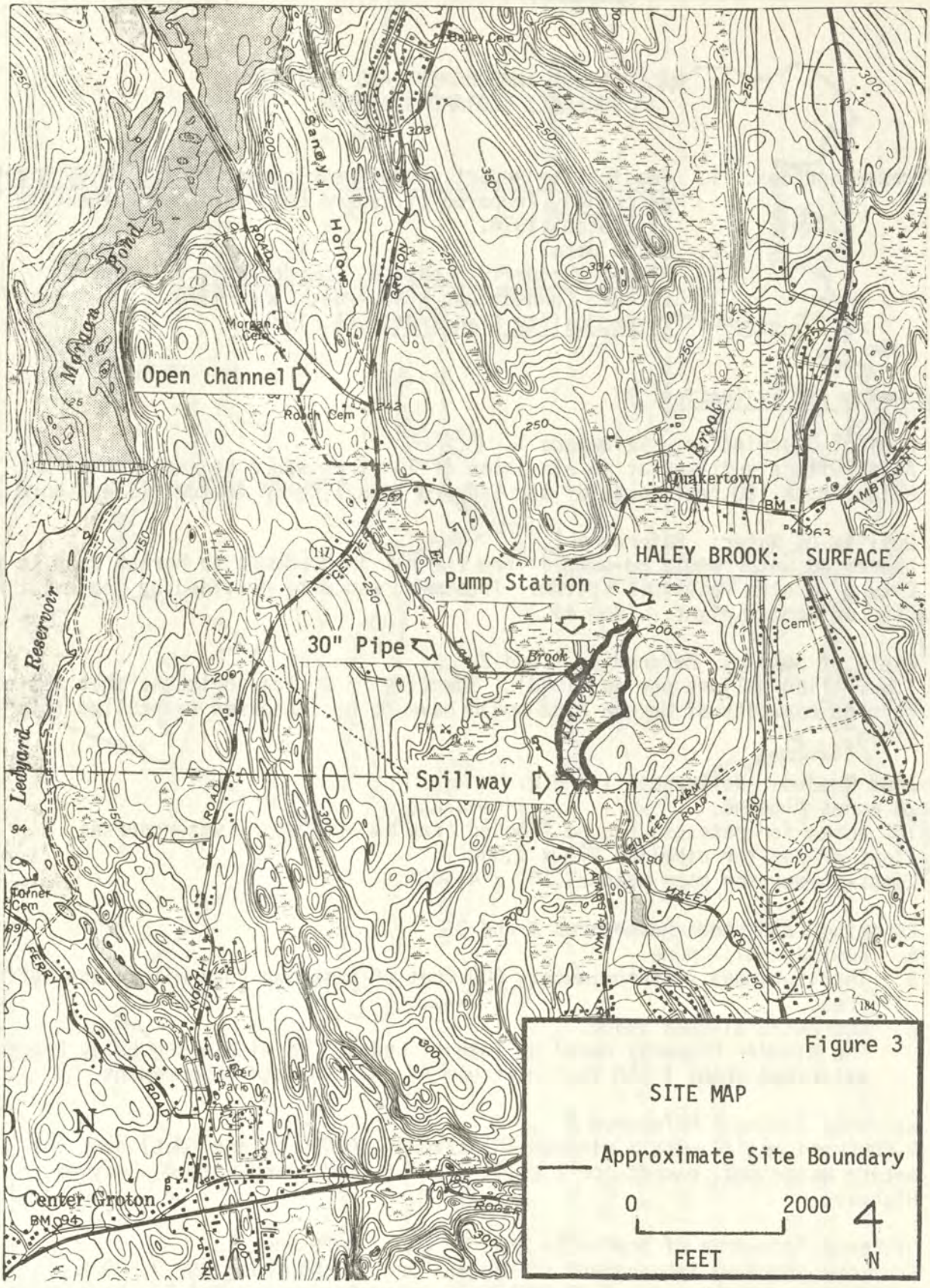


Figure 3

SITE MAP

Approximate Site Boundary

8. Energy Use: Reference 1.
Four pumps; two 7,000 gpm and two 320 gpm.
Head required 55'.
One of the smaller pumps would be in service continuously. One of the larger pumps would operate 30% of the days for intermittent periods of time.

9. Current Stream Classifications: Reference 4.
Haley Brook: Class A (suitable for drinking water supply).

10. Minimum Flows: Reference 1.
0.3 mgd will be left in the brook.

11. Possibility of Future Expansion: Reference 1.
Area is relatively undeveloped. A rise in water level of up to 10 feet might be investigated. However, runoff curves indicate not much more water in the watershed could be included in the safe yield.

12. Costs: References 1 and 2.
Construction and engineering costs were $500,000 in 1974. Based upon the Construction Cost Index the cost in March 1977 was estimated to be $622,000. Land acquisition costs are not included.

13. Point Sources of Pollution: References 2 and 3.
There are no sewage treatment plants or industries discharging into the Haley Brook Watershed. The Blonder property, a town-owned recreation area where active recreation facilities are planned, is in the watershed about 1,100 feet upstream of the proposed impoundment.

14. Non-point Sources of Pollution: Reference 2.
The Haley Brook watershed contains 2 farms and about 40 single-family residences. It is possible that fertilizer or septic tank failures could cause pollution. However, the area is very sparsely developed, except along Colonel Ledyard Highway, where most of the development is located.

15. Implementation Considerations: References 1 and 2.
Four or five years would appear reasonable for property acquisition, design and construction. Although the City of Groton has water rights in Ledyard, Sections 13 and 34 of Special Act 381 which created the SCWA provide that SCWA should develop new sources of supply.

2: SHEWVILLE BROOK: DIVERSION AND PUMPING STATION, PRESTON

Reference Sources:
1. Water Supply Plan for the Southeastern Connecticut Region, SCRPA and SCWA, 1970.
2. Feasibility Report, Water Supply for Groton Utilities, Prepared by Lenard Engineering for the SCWA, June, 1972.
3. SCRPA Data.
4. Water Quality Standards, DEP, 1976.

Discussion and Evaluation

1. Project Description: Reference 2.
Water would be pumped from a site on Shewville Brook near Gay Pond in Preston to the Billings Avery Diversion of the Groton system. (See Figure 4.) The City of Groton indicates that the storage capacity of Morgan Pond would have to be increased to utilize this yield.

2. Quality of Water: Reference 2.
Untreated water would be pumped and added to the Groton system; treatment would occur at the existing Groton treatment plant. (See #9.)

3. Yield of Supply: Reference 2.
Seven-day low flow, 1.7 mgd; thirty-day low flow, 2.8 mgd; safe augmentation to the Groton system: 3.0 to 4.0 mgd.

4. Land Needed: References 2 and 3.
Shewville Impoundment: 1 acre.
Diversion main: 20' x 14,000' right-of-way.
Setback 100' from Shewville Brook and Gay Pond: 28 acres.

5. Existing Land Use: Reference 3.
Residential: In the land that would have to be taken for the project, one house is located. The rest of the land is undeveloped.

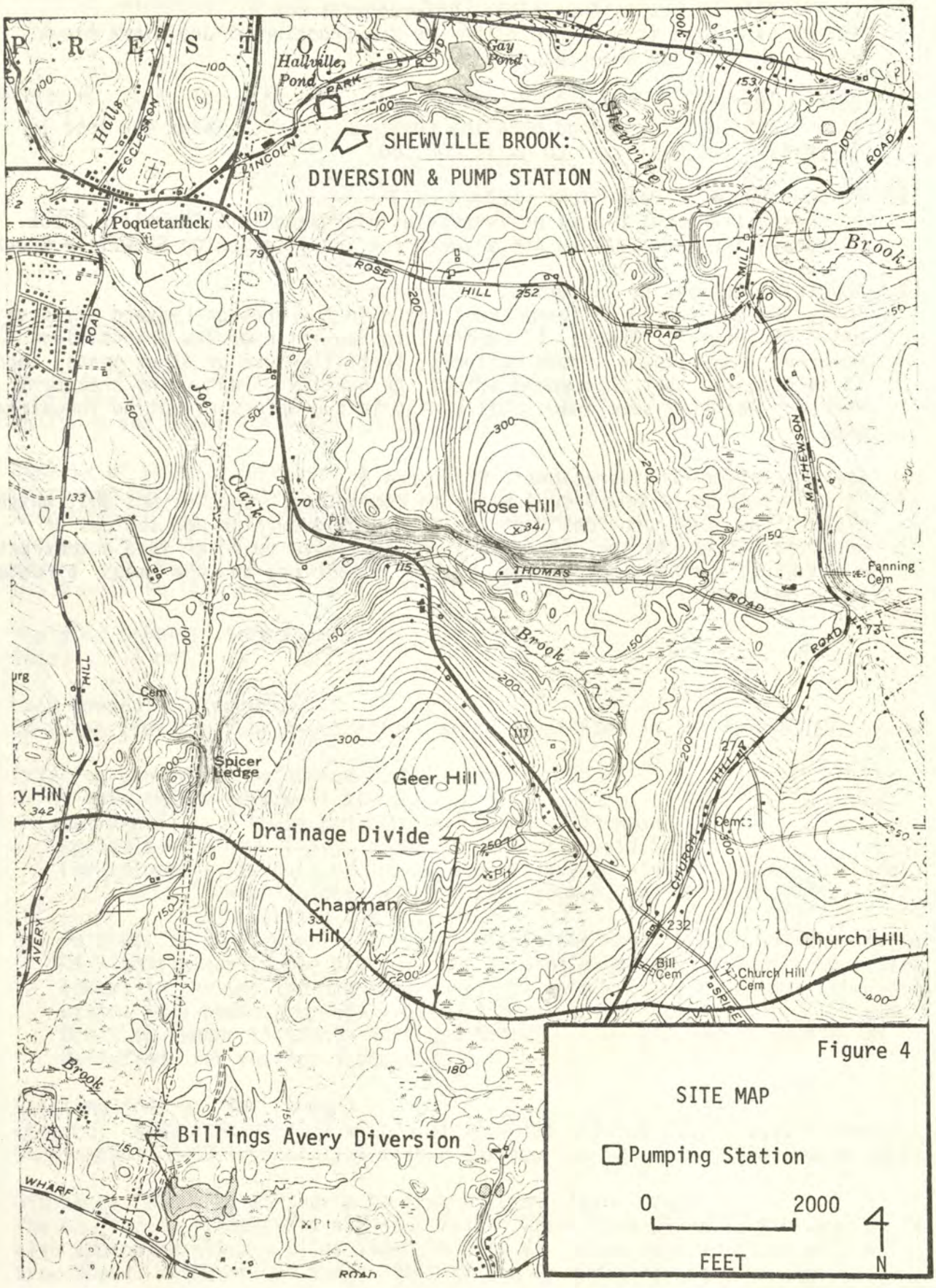
6. Existing Zoning: Reference 3.
Preston: R-40 - residential with a minimum lot size of 40,000 square feet.
Ledyard: R-60 - residential with a minimum lot size of 60,000 square feet.

7. Distance from Area of Source to Area of Use: Reference 2.
Shewville Brook to Billings Avery Diversion: Approximately 3 miles.

8. Energy Use: Reference 2.
Pumping is required from Shewville Brook to the Billings Avery drainage divide. Information is not yet available on the number of pumps and their capacity.

9. Current Stream Classifications: Reference 4.
Shewville Brook: Class A (suitable for drinking water supply).

10. Minimum Flows: Reference 2.
7-day low flow = 1.9 mgd, exceeded 94% of the time.
30-day low flow = 2.8 mgd, exceeded 90% of the time.


SHEWVILLE BROOK:
DIVERSION & PUMP STATION
Billings Avery Diversion
Drainage Divide
Rose Hill
Geer Hill
Chapman Hill
Church Hill
Spicer Ledge
Poquetanuck
Hallville Pond
Gay Pond
Shewville Brook
Joe Clark Brook
Thomas Brook
Mill Brook
Rose Hill Road
Mathewson Road
Church Hill Road
Spicer Hill Road
Avery Hill
Wharf Road
Lincoln Park
Hallville Road
Panning Cem
Bill Cem
Church Hill Cem
Cem
Pit
Figure 4
SITE MAP
Pumping Station
0
2000
FEET
N

11. Possibility of Future Expansion: References 1 and 2.
Future expansion is possible either by construction of Joe Clark Brook Reservoir or Broad Brook Reservoir.

12. Costs: References 2 and 3.
$1,540,000 in 1972. Based upon the Construction Cost Index the cost in March 1977 was estimated to be $2,208,360.

13. Point Sources of Pollution: Reference 3.
No sewage treatment plants or industries discharge into Shewville Brook. No sewage treatment plants are planned for installation on Shewville Brook.

14. Non-Point Sources of Pollution: Reference 3.
About 500 houses and 15 farms are located in the Preston-Ledyard drainage basin of Shewville Brook. If runoff into Shewville or its tributaries occurred from septic system failures, fertilizer use or other means, then it is possible that this would affect the quality of water and treatment needed. There is some industrial zoning in the watershed but no industrial uses.

15. Implementation Considerations: Reference 3.
This project could take 3 or 4 years to completion. Special Act 381, which created the SCWA, provides that the SCWA should develop new sources of supplies. SCWA and the City of Groton would have to enter into a contract which would specify engineering, timing, financing, and the amount of water to be delivered.

3: WHITFORD/WILLIAMS BROOK: GROUNDWATER, LEDYARD & STONINGTON

Reference Sources:
1. Hydrogeology of Southeastern Connecticut, Robert Melvin, USGS in cooperation with the SCWA and the Office of State Planning, 1973.
2. Water Resources Inventory of Connecticut, Part 3, Lower Thames and Southeastern Connecticut Coastal River Basins, USGS, Thomas et al, 1968.
3. SCRPA data.
4. Water Quality Standards, DEP, 1976.

Discussion and Evaluation

1. Project Description: Reference 3.
A wellfield could be developed along Whitford Brook below the junction of Whitford and Shewville Roads. (See Figure 5.)

2. Quality of Water: Reference 2.
Untreated water is potentially available for pumping as a water supply source. According to the 1968 USGS study, during periods of low flow in Whitford Brook, iron concentrations exceeding the 0.3 ppm standard have been identified. (See #9.) The Mystic Valley District of the Connecticut American Water Company has a well in this aquifer which is treated for iron removal.

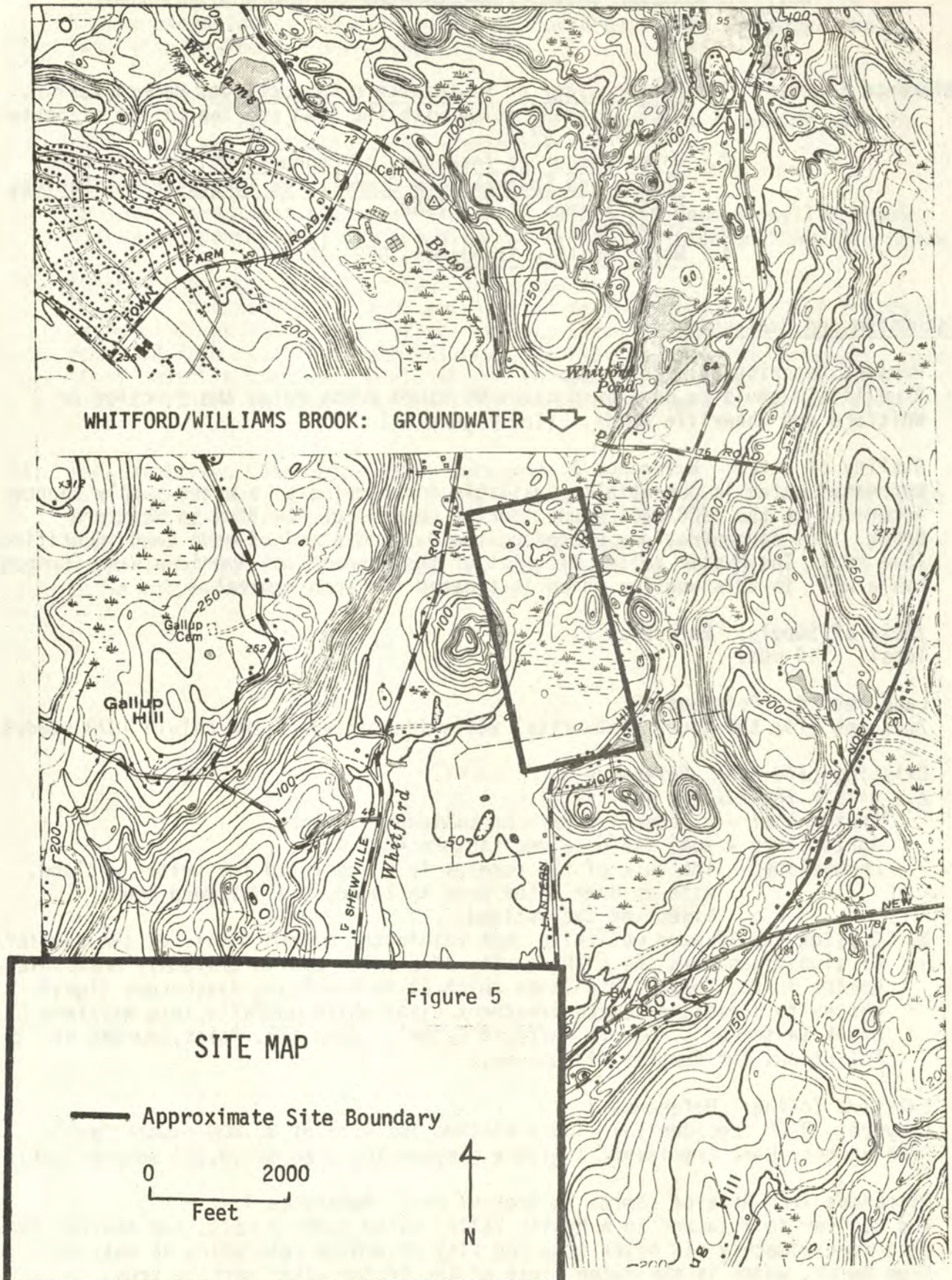
3. Yield of Supply: Reference 1.
Total: 1.4 mgd.

4. Land Needed: Reference 3.
20 acres (for the four hypothetical wells identified in the Melvin 1973 study).

5. Existing Land Use: Reference 3.
   A. Within the 20-acre well site:
      Residential - 1 house and barn on Lantern Hill Road.
      Agriculture - some fields along Lantern Hill Road.
      Undeveloped - The bulk of the acreage is a vegetated freshwater wetland, with an open water pond included, and Whitford Brook bisecting the wetland.
   B. Outside the 20-acre well site, but within the mapped limits of the aquifer: Of significance is the high density of single- and multi-family home development in the Ledyard Highlands which at this writing discharges liquid wastes to a package sewage treatment plant which outfalls into Williams Brook (a feeder stream to Whitford Brook). (See #13, Point Sources of Pollution, for further discussion.)

6. Existing Zoning: Reference 3.
Ledyard: R-80 (residential with a minimum lot size of 80,000 square feet).
Stonington: R-60 (residential with a minimum lot size of 60,000 square feet).

7. Distances from Area of Source to Area of Use: Reference 3.
The aquifer is adjacent to a Mystic Valley Water Company well; the aquifer is also approximately six miles from the City of Groton reservoirs as well as from Noank, which is the outer limit of the Groton water service area.


WHITFORD/WILLIAMS BROOK: GROUNDWATER
Williams
Brook
Cem
FARM
ROAD
TOWN
Whitford
Pond
176 ROAD
Gallup
Cem
Gallup
Hill
Whitford
SHEWVILLE
LANTERN
NORTH
NEW
BM
UB
Hill
Figure 5
SITE MAP
Approximate Site Boundary
0
2000
Feet
N

8. Energy Use: Reference 1.
Pumping would be required to extract water, as well as to establish a pressure within the service mains. Pumping will be required to transport water south of the village of Old Mystic where a considerable grade will preclude gravity transport to that point.

9. Current Stream Classifications: Reference 4.
Whitford Brook - Class A (suitable for drinking water supply).
Williams Brook - Class C (unsuitable for drinking water supply).

10. Minimum Flows: not applicable.

11. Possibility of Future Expansion: not applicable.

12. Costs: Reference 3.
Based upon costs recently experienced in East Lyme for gravel packed wells, four wells, exploration, testing, design, and a pump station could cost a minimum of $215,000 for raw, untreated water. In addition, land would be needed (20 acres) and there would be yearly operational costs, and water would have to be piped to the Groton System.

13. Point Sources of Pollution: Reference 3.
The package sewage treatment plant serving the Highlands (Lifetime Homes) development in Ledyard has been identified as a point source. DEP has recently ordered the Town of Ledyard to seek a "long-term" solution to the failing treatment plant. One possible solution is to tie into the Old Mystic sewerage system.

14. Non-point Source of Pollution: Reference 3.
Agricultural uses (cropland) are located adjacent to the identified potential well strip. Runoff from fertilizers or other agricultural by-products could enter the Whitford/Williams Brook system to affect the water quality or determine the treatment needed to prepare water for public supply.

15. Implementation Considerations: Reference 3.
Engineering surveys, test wells, final wells, land acquisition, and system testing could take 1-2 years. This aquifer is currently used by the Mystic Valley system which has one well in it. When this system needs more supply, this groundwater could be a cheaper alternative than expanding the reservoir on Cobb's Brook. The potential yield of this aquifer is lower than that sought by Groton and would require 6 miles of pumping to enter the Groton system. It would therefore be more efficient to use this supply for Stonington-Mystic needs. For any new sources of supply the Mystic Valley District of the Connecticut American Water Company will have to present its needs to the SCWA.

4: ECCLESTON BROOK: GROUNDWATER, GROTON

Reference Sources: 1. Water Resources Inventory of Connecticut, Part 3, Lower Thames and Southeastern Connecticut Coastal River Basins, USGS, Thomas et al, 1968.

According to the USGS basins report, coarse-grained stratified drift has been identified as underlaying Eccleston Brook in Groton. The report, however, does not identify the area as a favorable or semi-favorable aquifer. Therefore, this possible water supply source will not be considered further in this study (no map is provided).

WEST OF THE THAMES RIVER, POTENTIAL NEW SOURCES

5: HUNTS BROOK RESERVOIR AND DIVERSION: MONTVILLE

Reference Sources:
1. Water Supply Plan for the Southeastern Connecticut Region, SCRPA and SCWA, 1970.
2. Report on Water Supply for the City of New London, Fay, Spofford, and Thorndike, 1977.
3. Water Resources Inventory of Connecticut, Part 3, Lower Thames and Southeastern Connecticut Coastal River Basins, USGS, Thomas et al, 1968.
4. SCRPA data.
5. Report on Water Works System for Municipalities of New London and Waterford, Fay, Spofford, and Thorndike, 1966.
6. Water Quality Standards, DEP, 1976.

Discussion and Evaluation

1. Project Description: Reference 2.
A dam with the spillway at an elevation of 186 feet would be constructed on Hunts Brook in Montville. (See Figure 6.) This is the elevation of Lake Konomoc, and the resulting reservoir would be interconnected with that existing reservoir. Thus the project would increase the capacity of the New London system. A diversion dam and pumping station would be constructed below the new reservoir, almost at the Montville-Waterford town line, and the water would be pumped back upstream to the reservoir.

2. Quality of Water: Reference 2 and 4.
Water treatment would be needed and would be provided at the proposed treatment plant at Lake Konomoc. In the late 1960's fly ash was dumped in the upper Hunts Brook watershed. The State Health Department indicated that a low pH problem could probably be handled by mixing with Lake Konomoc water and treatment at the proposed Konomoc plant. (See #9.) New London indicates that currently the pH tested at 6.2.

3. Yield of Supply: Reference 2.
4.9 mgd.

4. Land Needed: Reference 2.
Total area, including setbacks, 450 acres.
Water surface, 220 acres.

5. Existing Land Use: Reference 4.
Residential: There are approximately five houses in the watershed, along Fire Street, Oakdale Road and Old Colchester Road.
Institutional: Oakdale School and Montville High School are both very close to the edge of the watershed. Their properties straddle the drainage divide. They are now on public sewers. Two electric power lines cross the reservoir. 2600' of one line is in the reservoir, 600 feet of the other. 3600' of Fire Street and 600' of Turner Road would be flooded.
Industrial: Dumping of fly ash has taken place in the watershed at at least two sites, Reference 3.

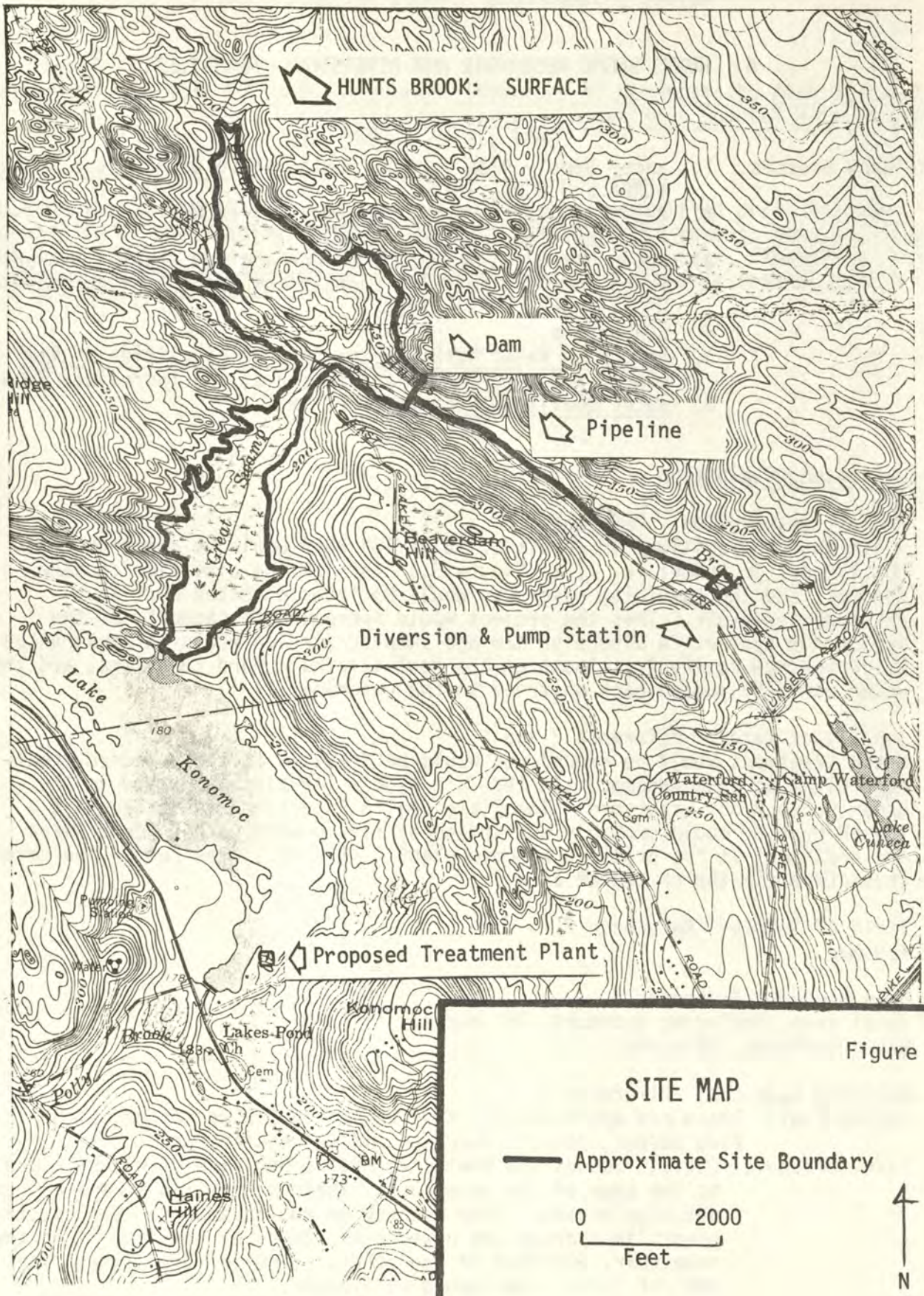


Figure 6

SITE MAP

Approximate Site Boundary

Agriculture: One farm is in the proposed reservoir along Fire Street.
One farm is in the buffer strip along Turner Road.
One farm is in the watershed on Old Colchester Road.
Undeveloped: The great majority of the watershed is undeveloped.
It is very rugged and for the most part wooded terrain.

6. Existing Zoning: Reference 4.
Montville RA-120 (residential/agricultural with a minimum lot size of 120,000 square feet).

7. Distance From Area of Source to Area of Use: Reference 2.
The reservoir would become an addition to Lake Konomoc. Water would be pumped about 1 mile from the diversion dam to the new reservoir.

8. Energy Use: Reference 2.
Pumping is required from the diversion dam to the reservoir. Information on the number and size of pumps is not available at this time.

9. Current Stream Classifications: Reference 6.
Hunts Brook - Class A (suitable for drinking water supply).

10. Minimum Flows: Reference 2 and 4.
The minimum stream flow release was estimated to range between 70,000 and 740,000 gallons per day for the structures at Hunts Brook. New London estimates that about 3 miles of downstream water rights would also have to be acquired.

11. Possibility of Future Expansion: Reference 2.
This is a two-phase project. First phase would be the reservoir. The second would be the diversion dam and pumping station.

12. Costs: References 2 and 4.
Current costs were estimated as follows:

Final planning	$ 210,000
Reservoir Construction	4,010,000
Diversion Dam and Pumping Station	1,020,000
	$5,240,000

In addition, approximately 3 miles of downstream water rights along Hunts Brook would have to be purchased.

13. Point Sources of Pollution: Reference 4.
There are no sewage treatment plants or industries in the watershed. There has been dumping of fly ash in the watershed of Hunts Brook. Two locations for this are given in Reference 3. The first is on the east branch of Deep Hollow Brook near Chesterfield-Oakdale Road. The other is on Moxley Hill Road. It appears that this latter site must drain into Hunts Brook below the proposed diversion dam. As noted in #2 (Quality of Water) the State Health Department indicated the pH problem could be handled with mixing with Lake Konomoc. The fly ash problem should be fully evaluated before Hunts Brook can be considered as a water supply source.

14. Non-point Sources of Pollution: Reference 4.
About 125 houses and three farms exist in the drainage basin. It is thus possible that septic tank failures or fertilizer could cause pollution of the reservoir.

15. Implementation Considerations: Reference 4.
A major project such as this one could take 5 years for design, land acquisition, and construction. Under the provisions of Special Act 381, as discussed earlier, the SCWA would have to enter into an agreement with the City of New London for analysis, engineering, financing, and potential development of the water supply.

6: JORDAN AND NEVINS BROOKS: GROUNDWATER, WATERFORD

Reference Sources:
1. Hydrogeology of Southeastern Connecticut, Robert Melvin, USGS in cooperation with the SCWA and the Office of State Planning, 1973.
2. Report on the Water Supply for the City of New London, Fay, Spofford, and Thorndike, 1977.
3. SCRPA data.
4. Water Quality Standards, DEP, 1976.
5. Town of Waterford, Connecticut Report on Test Well Program Jordan Brook Area, Hayden, Harding & Buchanan, 1965.

Discussion and Evaluation

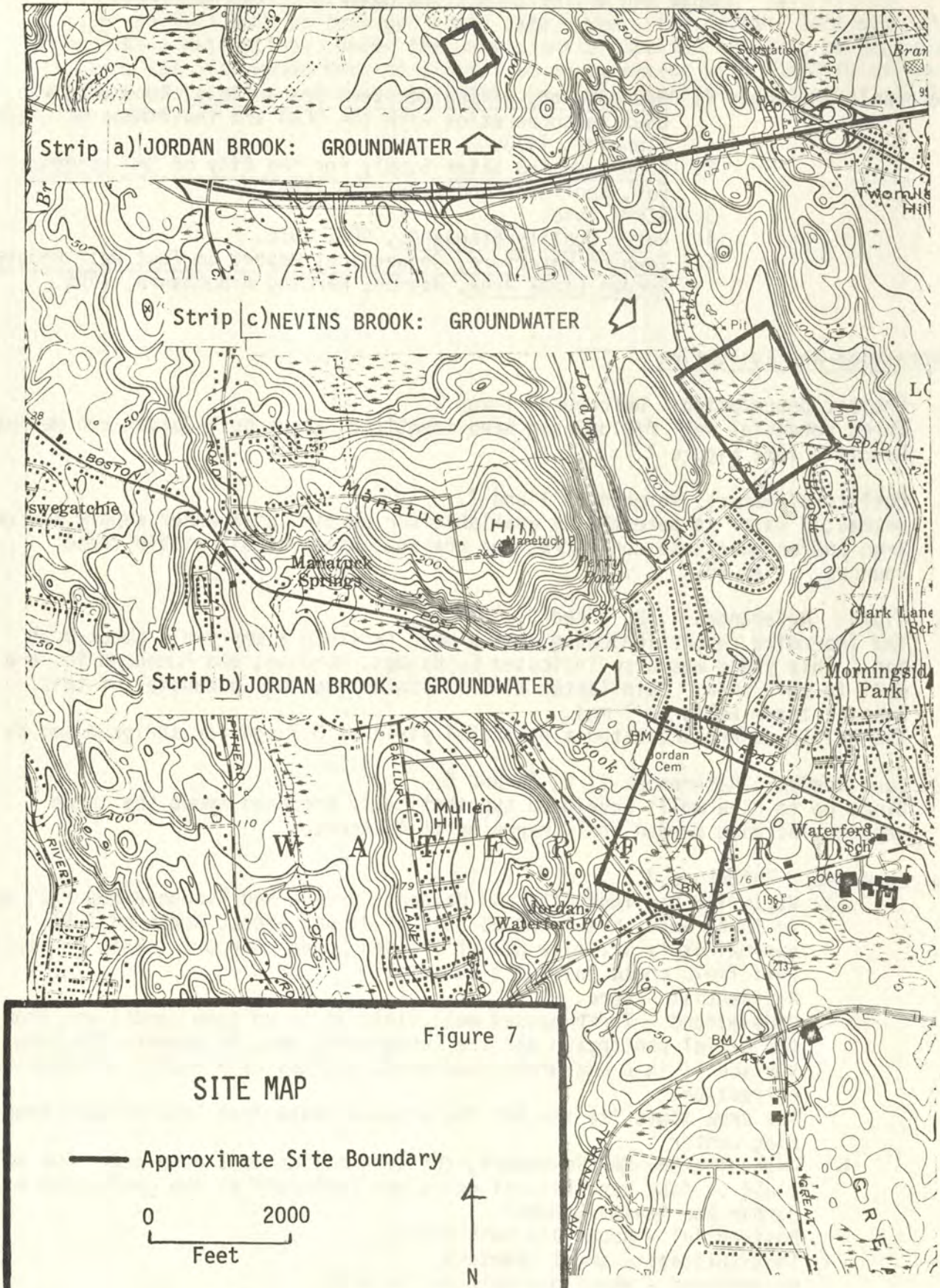
1. Project Description: References 1 and 2.
Three potential well fields have been identified along both Jordan and Nevins Brooks. (See Figure 7.)

2. Quality of Water: References 1 and 2.
Untreated water is potentially available for pumping as a water supply source. Iron and/or manganese concentrations are not objectionable within these sources. (See #9.)

3. Yield: References 1, 2, 3 and 5.
The Thorndike report indicated that a well in strip a may yield about 0.35 mgd. This yield was also indicated by Hayden, Harding, and Buchanan for one well in this area. This latter firm indicated the full potential of this area at three wells or 1 mgd.
The Melvin report indicated a potential yield of 0.7 mgd for strips b and c.

4. Land Needed: References 1, 2, 3, and 5.
Since up to nine wells have been hypothetically proposed among the three reports, acreage needed could range up to 45 acres.

5. Land Use: Reference 3.
   a) Regarding the Thorndike and Hayden, Harding and Buchanan reports, up to three wells are proposed east of Jordan Brook, north of I-95, approximately 1/2 mile NNW of the New London Airport. This proposed well field could involve 5-15 acres.
   Residential - none.
   Undeveloped - The proposed well field is in an open condition; from the aerial photograph and the topographic map, it appears the land surface is in a disturbed condition, perhaps as a result of materials extraction.
   The area abuts (to the NW) the proposed Waterford Square Plaza shopping center.
   b) Regarding the Melvin report, two well fields were proposed. One well field of four hypothetical wells was indicated at the confluence of Jordan and Nevins Brooks.
   Residential - house and outbuilding.
   Institutional - small cemetery.
   Undeveloped - about one-half of the area.


Strip a) JORDAN BROOK: GROUNDWATER
Strip c) NEVINS BROOK: GROUNDWATER
Strip b) JORDAN BROOK: GROUNDWATER
BOSTON ROAD
Manatuck Hill
Manatuck Springs
Swegatchie
Mullen Hill
Jordan Cem
Waterford Sch
Jordan Waterford PO
Mornings Park
Clark Lane
Twomile Hill
WATERFORD
Figure 7
SITE MAP
Approximate Site Boundary
0 2000
Feet
N

c) The other well field proposed in the Melvin report indicated two wells along Nevins Brook (immediately southeast of the New London Airport).
Residential - 5 houses.
Industrial - a small, operational sand and gravel pit.
Undeveloped - the bulk of the acreage is a vegetated freshwater wetland.

6. Existing Zoning: Reference 3.
Well field a) commercial.
b) R-20 (residential with a minimum lot size of 20,000 square feet).
c) R-20 (residential with a minimum lot size of 20,000 square feet).

7. Distance from Area of Source to Area of Use: Reference 3.
All well fields described above are within the service area of the New London public water system.

8. Energy Use: References 1 and 2.
Pumping would be required to extract water, as well as to establish a pressure within the service mains.

9. Current Stream Classifications: Reference 4.
Jordan Brook - Class A (suitable for drinking water supply).
Nevins Brook - Class A (suitable for drinking water supply).

10. Minimum Flows: not applicable.

11. Future Expansions: not applicable.

12. Costs: Reference 2.
The Thorndike report indicated a sum of $300,000 is needed to test and develop Jordan Brook and/or Lakes Pond Brook as feasible groundwater supplies. A more detailed cost estimate is not currently available.

13. Point Sources of Pollution: Reference 3.
Well field a) If this well field is not located sufficiently upstream, the proposed Waterford Square Plaza shopping center could serve as a point source in terms of runoff. The commercial center, at this writing, is scheduled to be served by public sewers by 1979.

14. Non-point Sources of Pollution: Reference 3.
Well field b) Considerable subdivision development exists upstream of this proposed well field. As all development is currently served by on-site sewage disposal systems, present water quality could be affected. These areas are scheduled to be served by public sewers by 1979.
Well field c) Agricultural uses, primarily pastureland, are located adjacent to the identified potential well field.

15. Implementation Considerations: References 2 and 3.
Engineering surveys, test wells, land acquisition, final wells, and system-testing could take 1-2 years. This alternative was recommended by the consulting firm for the City of New London. The City Council has asked the City administration to prepare recommendations for testing and developing these wells. It therefore appears that this proposal has a good chance of implementation.

7: LAKES POND BROOK: GROUNDWATER, WATERFORD

Reference Sources:
1. Hydrogeology of Southeastern Connecticut, Robert Melvin, USGS in cooperation with the SCWA and the Office of State Planning, 1973.
2. Report on the Water Supply for the City of New London, Fay, Spofford, and Thorndike, 1977.
3. SCRPA data.
4. Water Quality Standards, DEP, 1976.

Discussion and Evaluation

1. Project Description: Reference 1.
One potentially developable well field has been identified south of Lake Konomoc (see Figure 8).

2. Quality of Water: Reference 1.
Untreated water is potentially available for pumping as a water supply source. Iron and manganese concentrations of less than the acceptable state health standards of 0.3 ppm and 0.05 ppm, respectively, are present in this source. (See #9.)

3. Yield: Reference 1.
A total of 0.5 mgd is given in the Melvin report, this agrees with the potential yield indicated in the Thorndike report (the Lakes Pond Brook aquifer is referred to as the "Speed Bowl" in that report).

4. Land Needed: Reference 3.
Approximately 10 acres of land would be needed for the two hypothetical wells proposed in both the Melvin and Thorndike reports.

5. Land Use: Reference 3.
The two hypothetical wells shown in the Melvin report are located south of Lake Konomoc, between the dam and the Waterford Speed Bowl.
Residential - one house.
Commercial - Waterford Speed Bowl (involving a considerable parking area).
Institutional - small cemetery.
Undeveloped - a portion of the well strip is a vegetated wetland and stream.

6. Existing Zoning: Reference 3.
The majority of the proposed well field is zoned for industry. A small portion of the northeastern part is zoned R-120 (residential use with a minimum lot size of 120,000 square feet).

7. Distance from Area of Source to Area of Use: Reference 3.
The proposed wells appear to be within 1000' of the water transmission mains of the current New London public water supply system. The proposed water treatment plant will be within one-half mile of the proposed well also.

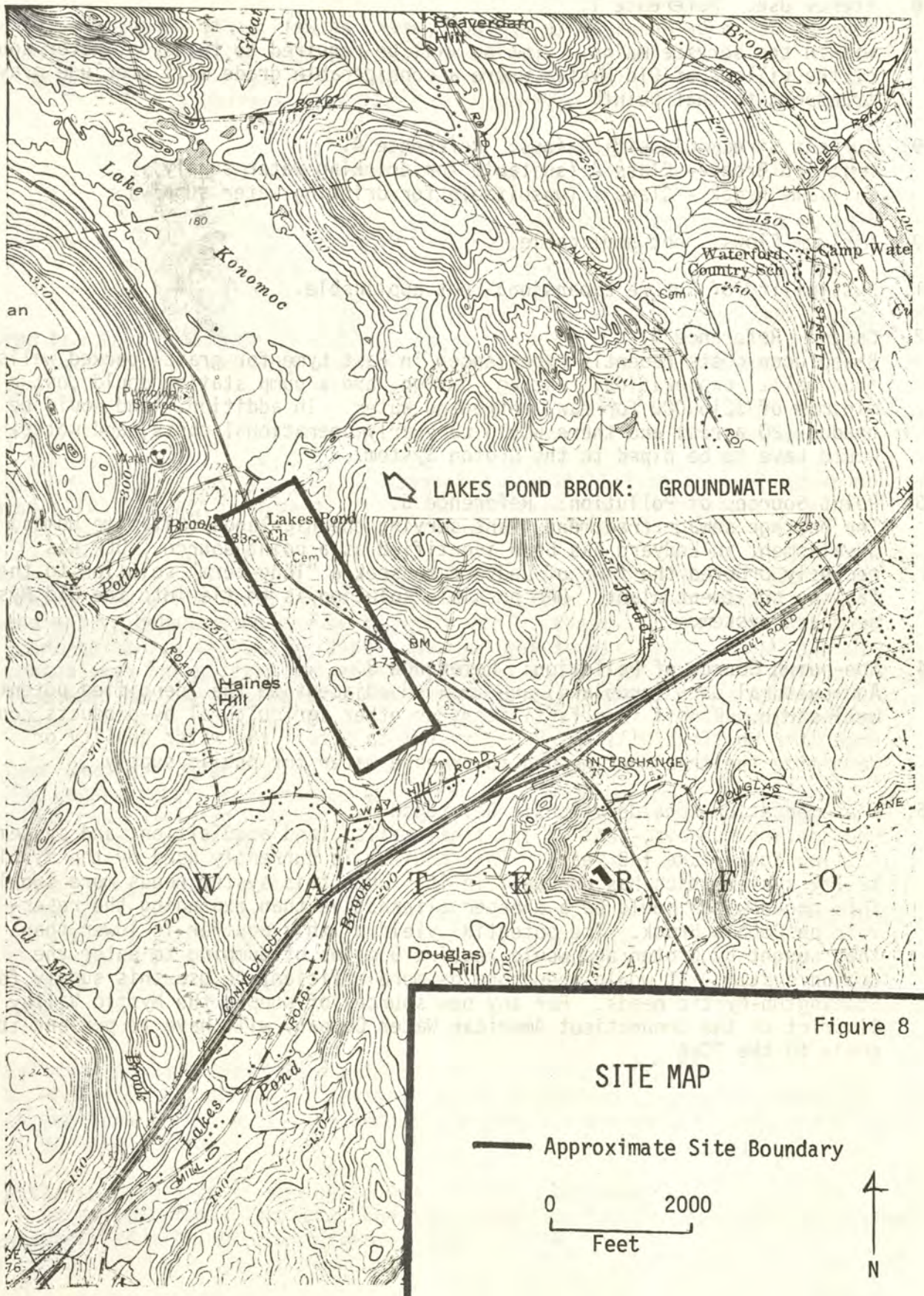


Figure 8

SITE MAP

Approximate Site Boundary

0 2000

Feet

N

8. Energy Use: Reference 3.
Pumping would be required to extract water, as well as to establish a pressure within the service mains in the event that the water would be transported for mixing to the proposed water treatment plant north (upgrade) from the well sites. More precise information is not currently available.

9. Current Stream Classifications: Reference 4.
Lakes Pond Brook - Class A (suitable for drinking water supply).

10. Minimum Flows: not applicable.

11. Future Expansion: Reference 3.

12. Costs: Reference 2.
The Thorndike report indicated a sum of $300,000 is needed to test and develop Jordan Brook and/or Lakes Pond Brook as feasible groundwater supplies.

13. Point Sources of Pollution: Reference 3.
None have been identified.

14. Non-point Sources of Pollution: Reference 3.
Scattered residential uses plus the Waterford Speed Bowl (specifically parking lot run-off) could affect local water quality.

15. Implementation Considerations: References 2 and 3.
Engineering surveys, test wells, land acquisition, final wells and system testing could take 1-2 years. This alternative was recommended by the consulting firm for the City of New London. The City Council has asked the City administration to prepare recommendations for testing and developing these wells. It therefore appears that this proposal has a good chance of implementation.

8: OXOBOXO LAKE: GROUNDWATER, MONTVILLE, SALEM, BOZRAH

Reference Sources:

1. Water Resources Inventory of Connecticut, Part 3, Lower Thames and Southeastern Connecticut Coastal River Basins, USGS, Thomas et al, 1968.
2. Potential Water Sources in the Vicinity of Oxoboxo Lake, Prepared by John Lenard Engineers for the SCWA, 1975.
3. Water Quality Standards, DEP, 1976.
4. Report on the Water Supply for the City of New London, Fay, Spofford, and Thorndike, 1977.
5. SCRPA data.
6. Twenty-Year Solid Waste Management Plan for Southeastern Connecticut 1975 to 1995, Resource Planning Associates, 1976.

Discussion and Evaluation

1. Project Description: Reference 5.
   A series of wells could be developed in the aquifer located between Oxoboxo Lake in Montville and Gardner Lake in Salem and Bozrah. (See Figure 9.)

2. Quality of Water: Reference 1.
   According to the 1968 USGS basin study, iron and manganese should not present objectionable water quality problems in this area. (See #9.)

3. Yield of Supply: Reference 1 and 2.
   The USGS basin report indicated two favorable ground water areas with a yield of 6.2 mgd. Lenard Engineering estimated a long-term minimum yield of 3.6 mgd from the two aquifers in the area. Further hydrological study and testing is needed to better determine the yield of this aquifer.

4. Land Needed: Reference 2.
   The Lenard report recommended that one aquifer be developed first with 3 wells (15 acres) yielding a total of 1.5 mgd. This was the yield also used by the City of New London in its recent study.

5. Existing Land Use: Reference 5.
   Three wells would require a minimum of 15 acres. Exact well locations are not indicated so detailed land uses are not possible. Generalized land uses in the Oxoboxo Valley - Gardner Lake valley are low density residential, agricultural and undeveloped. Residential concentrations are found at Oxoboxo Lake.

6. Existing Zoning: Reference 5.
   In Montville the zoning is residential on 3-acre lots and in Salem residential on one-acre lots. A 10-acre industrial zone is located along Route 82 south of Gardner's Lake.

7. Distance from Area of Source to Area of Use: Reference 2.
   To serve both Montville Manor and New London via Barnes Reservoir would require about 1 3/4 miles of transmission pipe.

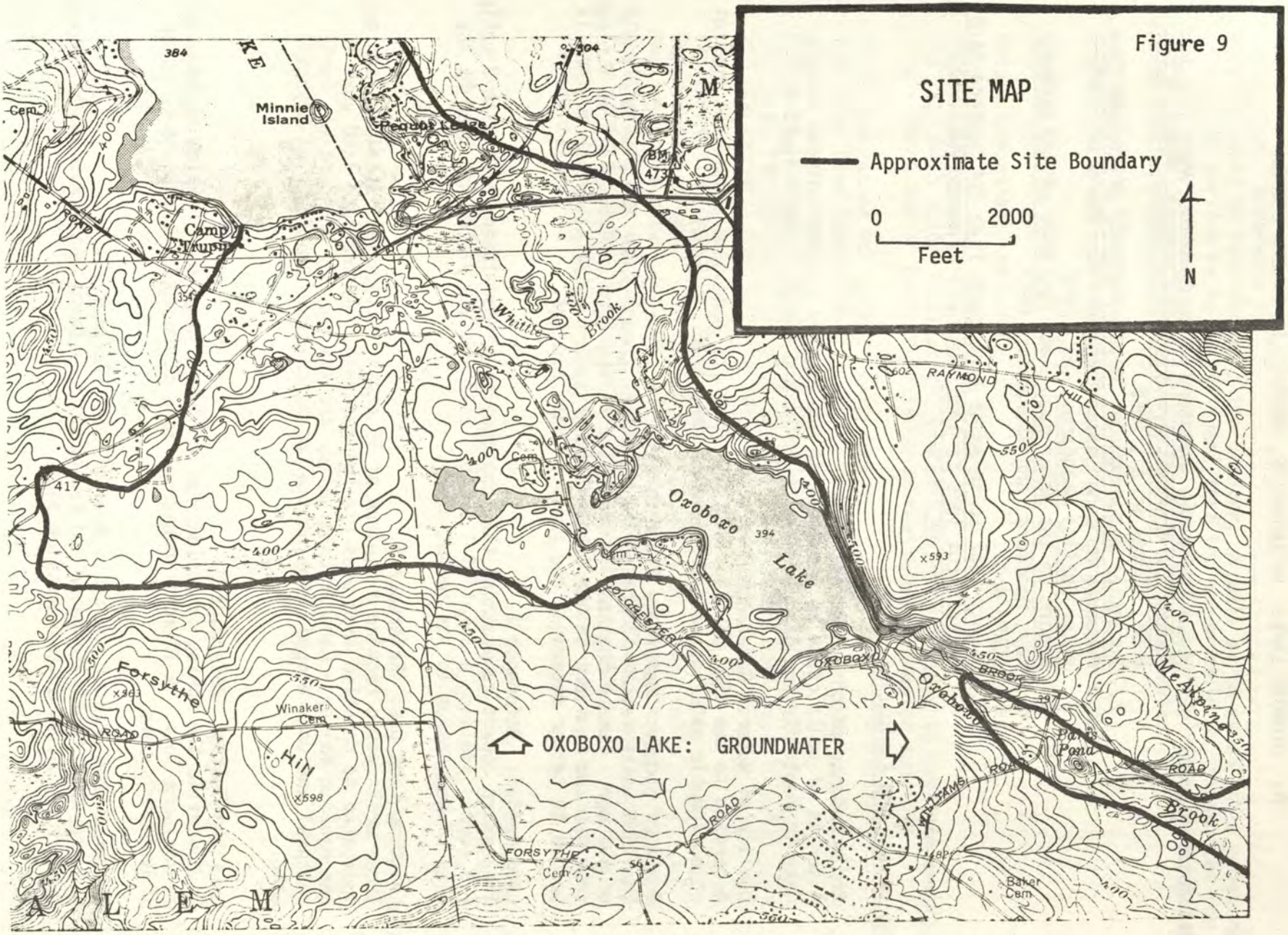


Figure 9
SITE MAP
Approximate Site Boundary
0
2000
Feet
N
Minnie Island
Camp Trupin
Oxoboxo Lake
Forsythe
Winaker Cem
Hill
Forsythe Cem
Baker Cem
Raymond Hill
McAvenue Brook
Pond
OXOBOXO LAKE: GROUNDWATER

8. Energy Use: Reference 2.
   Three pumps would be needed to pump water to Montville Manor and Barnes Reservoir.

9. Current Stream Classification: Reference 3.
   Oxoboxo Brook: Class A (suitable for drinking water supply).

10. Minimum Flows: not applicable.

11. Possibility of Future Expansion: Reference 2.
    The rest of the aquifer could be developed to bring the yield up to 3.6 mgd or higher, depending on what explorations and tests prove.

12. Costs: References 2 and 5.
    The Lenard report estimated in 1975 a cost of $437,500 for property acquisition, three wells, pumps, pipeline, improvements, engineering and contingencies. Based upon the Construction Cost Index the cost in March 1977 was estimated to be $497,000.

13. Point Sources of Pollution: References 5 and 6.
    No sewage treatment plant or industries discharge into Oxoboxo Brook upstream of the aquifer. The Town landfill is located on the edge of Wheeler Pond at the eastern end of the lower aquifer. It has a short remaining life estimated at 2 years in 1976. A paperboard company operates a private landfill for sludge waste on the east side of Williams Road north of Oxoboxo Brook. This is adjacent to the lower aquifer located southeast of Oxoboxo Lake.

14. Non-point Sources of Pollution: References 2 and 5.
    Three farms and associated agricultural fields are located in Salem. When well locations are chosen it should be determined if any runoff from any of these farms and fields will affect them. Residential uses surrounding Oxoboxo Lake have on-site septic systems. The Lenard report indicated that the Lake appeared virtually free of pollution and was not likely to be sewered in the near future.

15. Implementation Considerations: References 4 and 5.
    The total process of exploration, testing, engineering, and land acquisition could take 1-2 years. The SCWA owns and operates the system at nearby Montville Manor. Since this is a new source, it would be appropriate for SCWA to develop the source to supply both Montville Manor and New London via Barnes reservoir. If the source is further developed there would also be the possibility of serving the Oxoboxo Valley to Uncasville and tieing into any future main along Route 32. Salem and/or Montville, and New London would have to enter into an agreement with the Water Authority. The New London Engineering Report indicated that this location is too remote for New London operation and maintenance of well pumping stations. It recommends that development of wells, if feasible, should be undertaken by SCWA.

9: OXOBOXO LAKE RESERVOIR: SURFACE, MONTVILLE

Reference Sources:
1. Water Resources Inventory of Connecticut, Part 3, Lower Thames and Southeastern Connecticut Coastal River Basins, USGS, Thomas et al, 1968.
2. Potential Water Sources in the Vicinity of Oxoboxo Lake, Prepared by John Lenard Engineers for the SCWA, 1975.
3. Water Quality Standards, DEP, 1976.
4. Report on the Water Supply for the City of New London, Fay, Spofford, and Thorndike, 1977.
5. SCRPA data.

Discussion and Evaluation

1. Project Description: Reference 5.
Oxoboxo Lake in northwest Montville could be developed as a source of surface water. (See Figure 10.)

2. Quality of Water: Reference 1.
According to the 1968 USGS basin study, iron and manganese should not present objectionable water quality problems in this area. (See #9.)

3. Yield of Supply: Reference 2.
The Lenard report indicated that surface water could be obtained at the spillway of Oxoboxo Lake with a dry year yield of 1.5 mgd. This was the figure also cited in the New London engineering report.

4. Land Needed: Reference 2.
3 acres.

5. Existing Land Use: Reference 5.
Residential concentrations are found at Oxoboxo Lake. Approximately 45-50 houses are located within 250 feet of the Lake. The other surrounding land uses are low density residential or undeveloped. Three farms and associated fields are located in the watershed upstream of the Lake.

6. Existing Zoning: Reference 5.
Residential on 3-acre lots.

7. Distance from Area of Source to Area of Use: Reference 2.
To serve both Montville Manor and New London via Barnes Reservoir would require about 1.3 miles of transmission pipe.

8. Energy Use: Reference 2.
Water would have to be pumped from Oxoboxo Lake to Montville Manor and Barnes Reservoir from an intake works and structure on Oxoboxo Lake. Design of this has not yet occurred.

9. Current Stream Classification: Reference 3.
Oxoboxo Brook: Class A (suitable for drinking water supply).

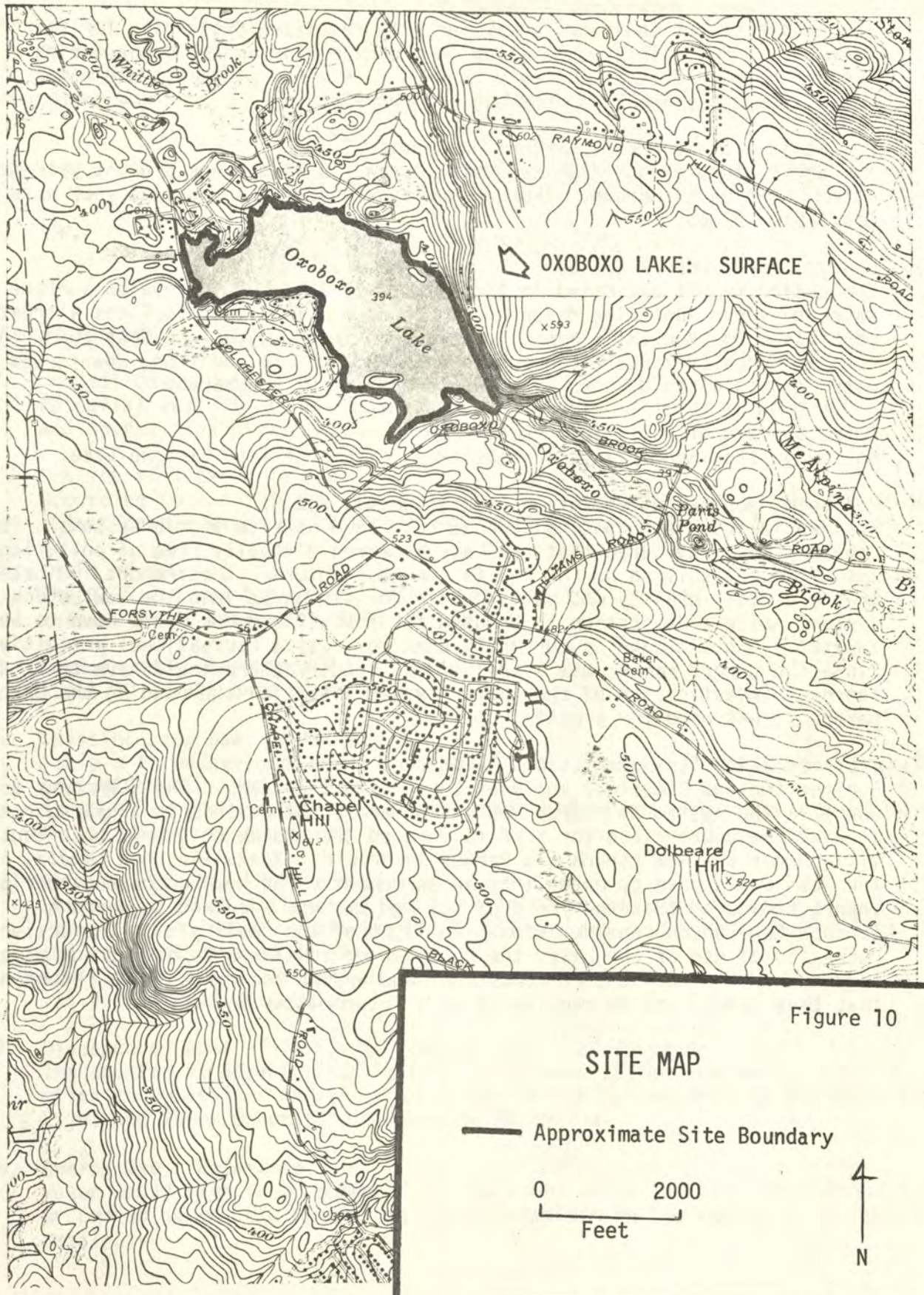


Figure 10

SITE MAP

Approximate Site Boundary

0 2000

Feet

N

10. Minimum Flows: References 2 and 5.
The Lenard report indicated a maximum safe regulated draft rate for the driest year of 1.5 mgd. This would allow maintaining flow in the Brook during a drought year. It is also likely that up to 6 miles of downstream water rights would have to be acquired from one or more firms.

11. Possibility of Future Expansion: Reference 2.
The above yield is based on the driest year. During a non-drought year more water could be withdrawn. The Lenard report indicated a median year safe draft of 3.2 mgd.

12. Costs: References 2 and 5.
The Lenard report estimated in 1975 a cost of $387,500 to develop surface water to serve Montville Manor and New London. This cost includes a treatment plant for Montville Manor. Based upon the Construction Cost Index the cost in March 1977 was estimated to be $440,200. In addition, downstream water rights along Oxoboxo Brook would have to be purchased.

13. Point Sources of Pollution: Reference 5.
No sewage treatment plants or industries discharge into Oxoboxo Lake.

14. Non-point Sources of Pollution: References 2 and 5.
Residential uses surrounding Oxoboxo Lake have on-site septic systems. The Lenard report indicated that the Lake appeared virtually free of pollution, and was not likely to be sewered in the near future. This report indicated that the water quality was satisfactory for discharge into the New London system, while that portion to be used for Montville Manor would have to be treated. Oxoboxo Lake is currently used for active recreational activities. Since the Lenard report was a preliminary inquiry there would have to be a thorough investigation of the septic system situation surrounding the Lake before it was used for a water supply.

15. Implementation Considerations: References 4 and 5.
Engineering and hydrology analyses could take 1-2 years. The SCWA owns and operates the system at nearby Montville Manor. Since this is a new source, it would be appropriate for SCWA to develop the source to supply both Montville Manor and New London via Barnes Reservoir. Montville, New London, and the SCWA would have to enter into an agreement. The New London engineering report indicated that the yield of 1.5 mgd was not adequate to warrant serious New London consideration. In light of the small yield, the active recreational use of the Lake, the purchase of considerable downstream water rights, and the residential concentrations around the Lake, it is recommended that this supply not be considered as a future water source.

10: TRADING COVE: GROUNDWATER, NORWICH & BOZRAH

Reference Sources:
1. Water Resources Inventory of Connecticut, Part 3, Lower Thames and Southeastern Connecticut Coastal River Basins, USGS, Thomas et al, 1968.
2. Hydrogeology of Southeastern Connecticut, Robert Melvin, USGS in cooperation with the SCWA and the Office of State Planning, 1973.
3. Water Quality Standards, DEP, 1976.
4. SCRPA data.

Discussion and Evaluation

1. Project Description: Reference 1.
   Potential well fields are located in the Trading Cove Brook aquifer in Norwich and Bozrah (See Figure 11.)

2. Quality of Water: Reference 1.
   According to the 1968 USGS basin study, iron and manganese should not present objectionable water quality problems in this area. (See #9.)

3. Yield of Supply: Reference 2.
   The USGS defined two strips within this aquifer composed of 8 hypothetical wells with an estimated yield of 1.9 mgd.

4. Land Needed: Reference 4.
   About 40 acres would be needed.

5. Existing Land Use: Reference 4.
   Strip a is undeveloped, with two agricultural fields. Some sand and gravel mining has occurred.
   Strip b is the undeveloped portion of a golf course which the City of Norwich is attempting to purchase.

6. Existing Zoning: Reference 4.
   Strip a is zoned residential 1/4-acre lots and industrial park in Norwich, commercial-industrial-residential in Bozrah, and residential 3-acre lots for the adjacent area in Montville.
   Strip b is zoned residential 1/4-acre lots in Norwich. The adjacent Montville zoning is industrial.

7. Distance of Area of Source to Area of Use: Reference 4.
   The aquifer is adjacent to the City of Norwich system and would be 5.5-6 miles to Uncasville and the City of New London system serving the Connecticut Light and Power Generating Station in Montville.

8. Energy Use: Reference 4.
   Water would have to be pumped from the eight wells and into the Norwich system or pumped south into Montville. No information on the design of the pumps is available.

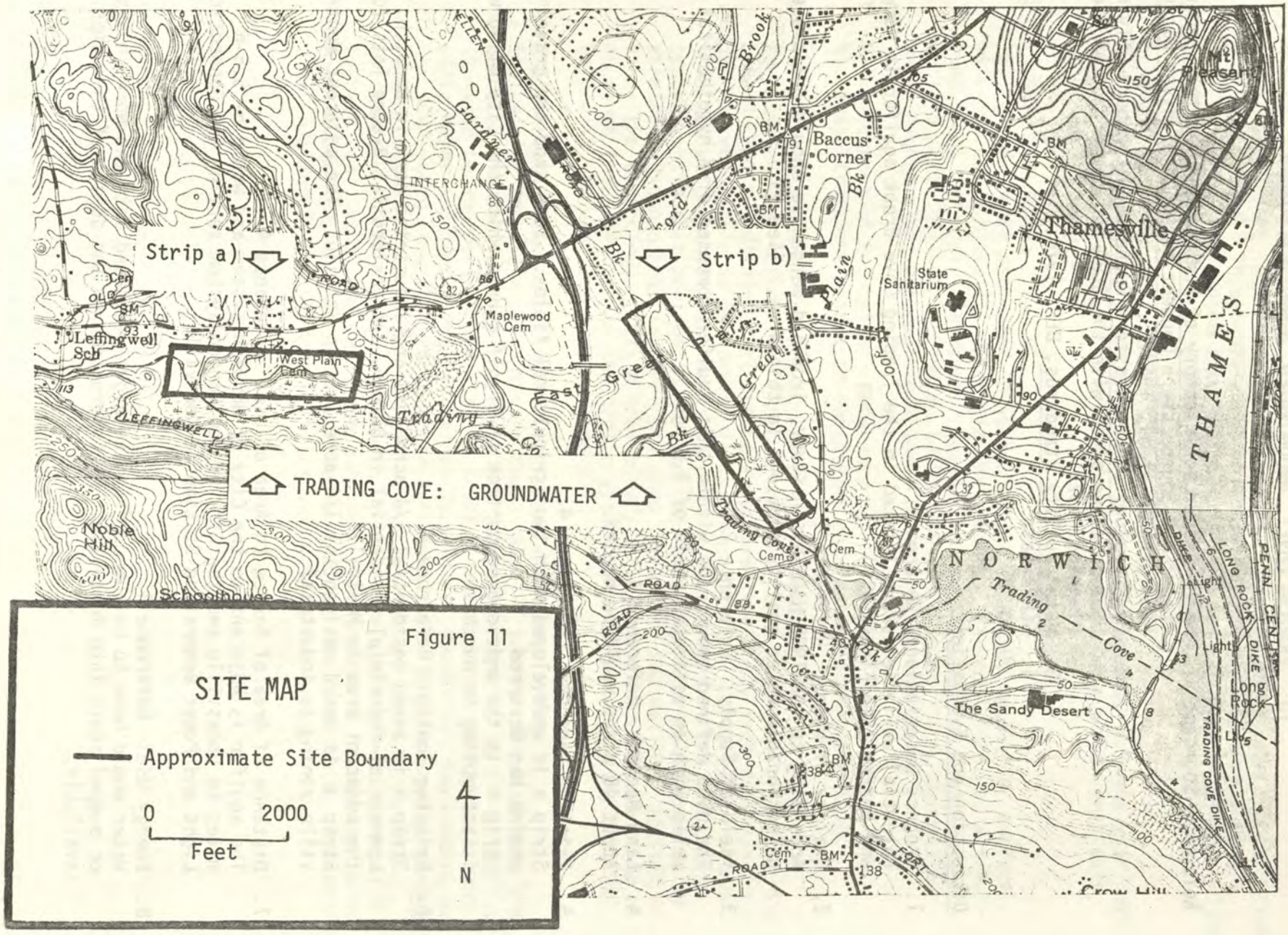


Figure 11

SITE MAP

Approximate Site Boundary

0 2000

Feet

N

9. Current Stream Classification: Reference 3.
Trading Cove: Class A (suitable for drinking water supply).

10. Minimim Flows: not applicable.

11. Possibility of Future Expansion: Reference 2.
No.

12. Costs: Reference 4.
Based upon recent East Lyme figures, a minimum cost for the project would be $375,000 for raw water, exclusive of land purchase (40 acres) and yearly operational costs.

13. Point Sources of Pollution: Reference 4.
No sewage treatment plants or industries discharge into Trading Cove Brook upstream of the aquifer.

14. Non-point Sources of Pollution: Reference 4.
Strip a. Two agricultural fields are in, and adjacent to, the aquifer. A subdivision (100+ units) is located north of the aquifer along Route 82 and Old Salem Road. It is served by public water with on-lot septic systems for sewage disposal.
Strip b . The densely developed residential area between New London Turnpike and Route 82 is located immediately northeast of the aquifer. This area has on-site sewage problems, and Norwich has applied for funds to extend lateral sewers to this area from the interceptor on Route 82.

15. Implementation Considerations: Reference 4.
Engineering surveys, test wells, final wells, testing, land acquisition, and bringing the system on line could take 1-2 years. If Norwich purchases the Norwich Golf Course, it will also be getting an aquifer (Strip b) which it would probably not use for 10 to 20 years since the City currently has excess water. Strip a is located in Norwich and Bozrah. If the water from both strips of the aquifer were to be used for public water supply, two alternatives for development exist. Either (1) Norwich or (2) the SCWA could become the developer and seller of water. In both cases, agreements with the towns to be served would have to be developed. Since the supply is close to the central corridor of the Region, it appears logical to consider it eventually in a north-south connection.

11: STONY BROOK RESERVOIR: SURFACE, MONTVILLE

Reference Sources:
1. Report on the Water Supply for the City of New London, Fay, Spofford and Thorndike, May, 1977.
2. Water Supply and Treatment Facilities for the City of Norwich, C.E. Maguire, 1968.
3. SCRPA data.
4. Water Quality Standards, DEP, 1976.

Discussion and Evaluation

1. Project Description: Reference 1.
The existing Stony Brook Reservoir in northern Montville is owned by Norwich. It is proposed to install pumps and a pipeline to Lake Konomoc. New London would then purchase the water from Norwich. (See Figures 6 and 12.)

2. Quality of Water: References 1 and 3.
Under the provisions of the Safe Drinking Water Act (1974), treatment would be necessary. If used for the City of New London, treatment would occur at the proposed Lake Konomoc plant. If used for Norwich or Montville, a small treatment plant would be necessary at the reservoir.

3. Yield of Supply: Reference 1.
2.2 mgd.

4. Land Needed: Reference 1.
None, except for pipeline and pump stations. Pipeline would be about 5.5 miles long.

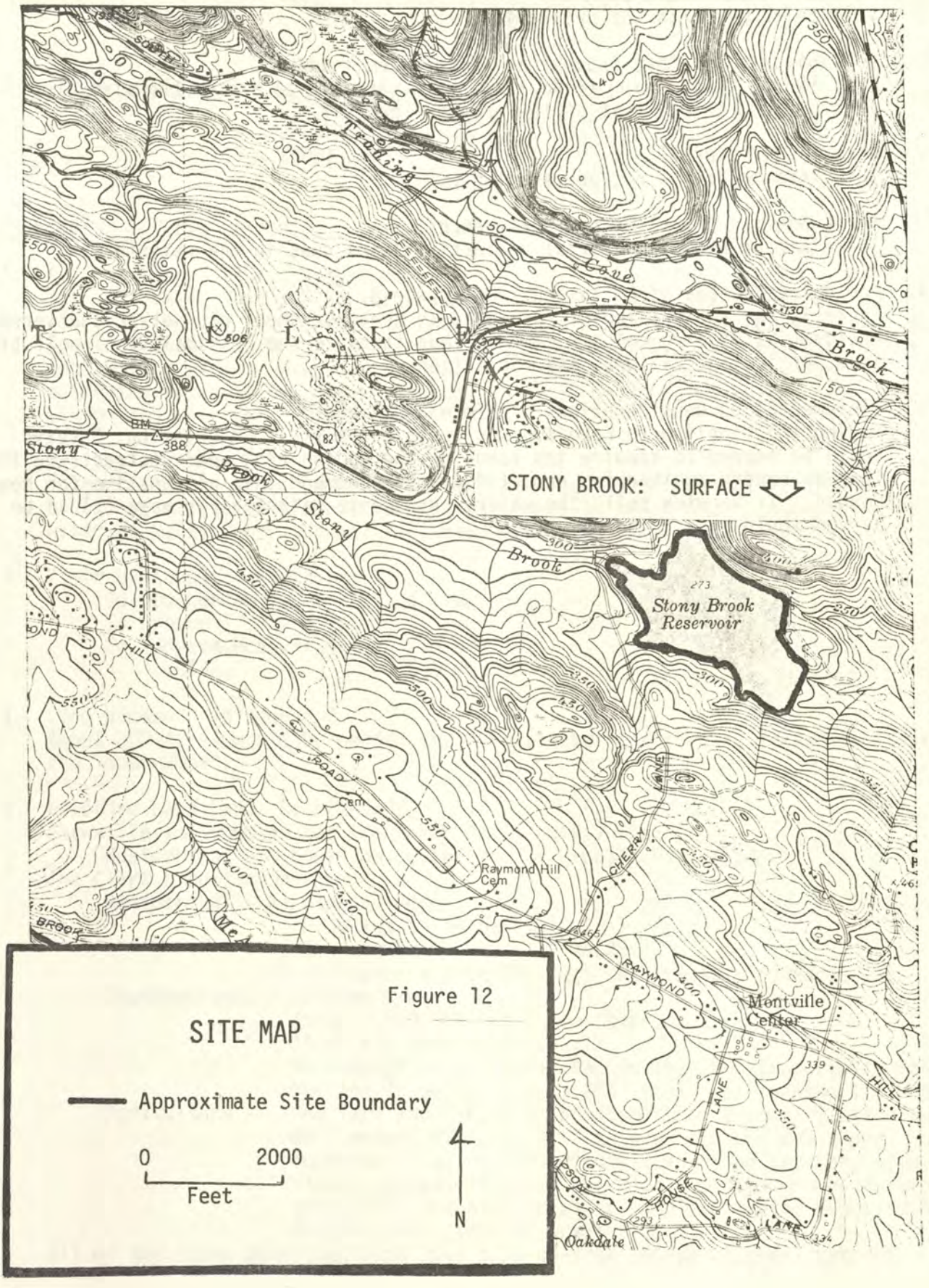
5. Existing Land Use: Reference 2.
Reservoir water surface: 70 acres.
Drainage Area: 2.6 sq. mi.
There is scattered development and one subdivision of 70 houses in the watershed. There are several farms.

6. Existing Zoning: Reference 3.
Reservoir is RA-120 (residential-agricultural uses with minimum lot sizes of 120,000 square feet).
Pipeline would cross RA-120 and RA-40 zones (residential and agricultural uses with minimum lot sizes of 120,000 and 40,000 square feet).

7. Distance from Area of Source to Area of Use: Reference 1.
Stony Brook Reservoir to Lake Konomoc is about 5.5 miles.

8. Energy Use: Reference 3.
Pumping would be required. No information is available on the size and number of pumps.

9. Current Stream Classification: Reference 4.
Stony Brook: Class AA (suitable for drinking water supply).


STONY BROOK: SURFACE
Stony Brook Reservoir
Stony Brook
Raymond Hill Cem
Montville Center
Oakdale
Figure 12
SITE MAP
Approximate Site Boundary
0
2000
Feet
N

10. Minimum Flows: Reference 1.
This information is not available.

11. Possibility of Future Expansion: References 1 and 3.
This is not discussed. It does not seem possible to expand the size of this project beyond that of the original project.

12. Costs: Reference 1.
This information is not yet available.

13. Point Sources of Pollution: Reference 3.
There are no known industrial or institutional uses in the watershed.

14. Non-point Sources of Pollution: Reference 3.
There is one subdivision of 70 houses in the watershed, plus other scattered residential development and farms. Thus there is the possibility of pollution from septic tank failures and fertilizers.

15. Implementation Considerations: References 1 and 3.
Laying the pipeline to Lake Konomoc would be no small undertaking. 5 years could be needed to acquire the land, do the engineering and construct the line. The New London engineering report did not recommend this alternative for New London. If Norwich sells the water, agreements with the purchaser(s) to be served would have to be developed.

12: PHASE I OF THE 1970 WATER SUPPLY PLAN

Reference Sources:
1. Water Supply Plan for the Southeastern Connecticut Region, Vol. 1 and 2, SCRPA and SCWA, 1970.
2. Water Quality Standards, DEP, 1976.
3. SCRPA data.

Discussion and Evaluation

1. Project Description: Reference 1.
The 1970 Water Supply Plan recommended a surface water system composed of a reservoir on Joe Clark Brook in Ledyard and an impoundment area and treatment plant on Shewville Brook in Preston. The reservoir would store runoff from both Joe Clark and Shewville Brooks. The system was intended to supply untreated water to Groton and treated water to Gales Ferry, Uncasville, New London and Waterford. (See Figure 13.)

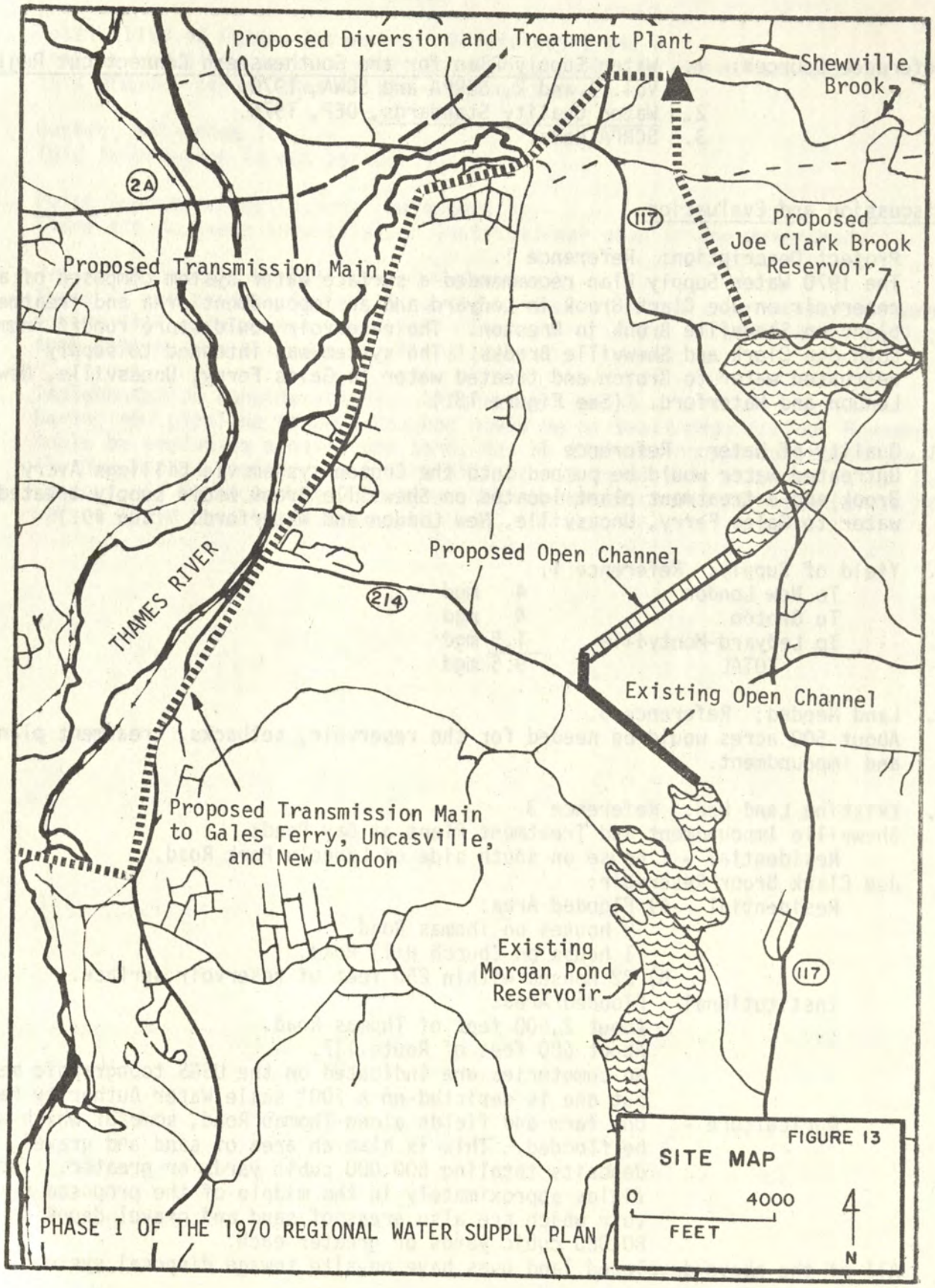
2. Quality of Water: Reference 1.
Untreated water would be pumped into the Groton system via Billings Avery Brook and a treatment plant located on Shewville Brook would supply treated water to Gales Ferry, Uncasville, New London and Waterford. (See #9.)

3. Yield of Supply: Reference 1.

To New London	4 mgd
To Groton	4 mgd
To Ledyard-Montville	1.5 mgd
TOTAL	9.5 mgd

4. Land Needed: Reference 3.
About 500 acres would be needed for the reservoir, setbacks, treatment plant, and impoundment.

5. Existing Land Use: Reference 3.
Shewville Impoundment and Treatment Plant at Gay Pond:
Residential - 1 house on south side of Lincoln Park Road.
Joe Clark Brook Reservoir:
Residential - A) Flooded Area:
9 houses on Thomas Road.
1 house on Church Hill Road.
B) 22 houses within 250 feet of reservoir surface.
Institutional - Flooded Area:
About 2,500 feet of Thomas Road.
About 600 feet of Route 117.
No cemeteries are indicated on the USGS topographic map, but one is depicted on a 200' scale Water Authority Map.
Agriculture - One farm and fields along Thomas Road, some of which would be flooded. This is also an area of sand and gravel deposits totaling 500,000 cubic yards or greater. Two fields approximately in the middle of the proposed reservoir which are also areas of sand and gravel deposits of 80,000 cubic yards or greater each.
All of the above developed land uses have on-site sewage disposal systems.


Proposed Diversion and Treatment Plant
Shewville Brook
2A
117
Proposed Joe Clark Brook Reservoir
Proposed Transmission Main
THAMES RIVER
214
Proposed Open Channel
Existing Open Channel
Proposed Transmission Main to Gales Ferry, Uncasville, and New London
Existing Morgan Pond Reservoir
117
PHASE I OF THE 1970 REGIONAL WATER SUPPLY PLAN
FIGURE 13
SITE MAP
0
4000
FEET
N

6. Existing Zoning: Reference 3.
Entire area is R-60 (residential use on minimum lots of 60,000 square feet).

7. Distance from Area of Source to Area of Use: Reference 3.
Reservoir to Groton system: 4,000-5,000 feet.
Shewville to Gales Ferry-Uncasville: 5.5-6 miles.
Shewville to New London: 6 miles to the main serving the CL&P generating station in Montville. If this main could not be used the distance is 10-11 miles.

8. Energy Use: References 1 and 3.
Pumping is required from Shewville Brook to Joe Clark Reservoir. From the Joe Clark Reservoir, gravity would serve to bring water into the Billings Avery diversion. However, if enough drawdown occurred, water would have to be pumped from Joe Clark to the Groton system.
From the treatment plant water would be pumped to Gales Ferry. Another pumping station would increase pressure to cross the Thames to Uncasville and the New London system. Details on design and number of pumps are not available.

9. Current Stream Classification: Reference 2.
Shewville Brook: Class A (suitable for drinking water supply).
Joe Clark Brook: Class A (suitable for drinking water supply).

10. Minimum Flows: Reference 1.
On Shewville Brook there is a 7-day low flow of 1.9 mgd, exceeded 94% of the time. The 30-day low flow is 2.8 mgd, exceeded 90% of the time.

11. Possibility of Future Expansion: Reference 1.
Joe Clark: no.
Shewville system: yes, via an upstream impoundment such as Broad Brook.

12. Costs: References 1 and 3.
Development of Phase I exclusive of operational and maintenance costs was estimated at $10,230,000 in 1970. Based upon the Construction Cost Index the cost in March 1977 was estimated to be $18,557,220.

13. Point Sources of Pollution: Reference 3.
No sewage treatment plants or industries discharge into Shewville Brook. No sewage treatment plants are planned for installation on Shewville Brook. The Ledyard landfill is located within the Joe Clark watershed about 500 feet from the potential reservoir site. The Preston landfill is located in the Shewville watershed about 500 feet from a tributary of Shewville Brook.

14. Non-point Sources of Pollution: Reference 3.
About 500 houses and 15 farms are located in the Preston-Ledyard drainage basin of Shewville Brook. If runoff into Shewville or its tributaries occurred from septic system failures, fertilizer use, or other means, then it is possible this would affect the quality of water and the treatment needed.

15. Implementation Considerations: Reference 3.
Ledyard, Groton, Montville, New London, and the SCWA would have to agree on amounts of water to be delivered, timing, and financing. The 1970 plan contained few details on intermunicipal-SCWA financing. Under SCWA's enabling legislation this could not be determined until a municipality requested water.

This system would supply 9.5 mgd, and Groton-New London together need about 3-4 mgd by 1985. It is unlikely that these cities would be willing to help finance capacity that they do not need over 10 years. New London is faced with constructing a treatment plant in Waterford to improve water quality. It is unlikely that New London would also be willing to help finance a second treatment plant in Preston. Since the 1970 Water Supply Plan was developed, a change in land use has occurred in the proposed reservoir site on Joe Clark Brook, thereby increasing the cost of the project and necessitating residential relocations. The Ledyard town landfill is located in the Joe Clark drainage basin less than 500 feet from the proposed reservoir on the south side of Route 117. Leachate from this facility could present a potential water quality problem for the reservoir. Agreements, financing, engineering, and construction could easily take 5 years to complete for this project.

IV. EVALUATION OF ALTERNATIVES

INTRODUCTION

This Chapter evaluates the alternatives described in Chapter III in terms of meeting 1985 needs. The planning evaluation attempts to look at these short-term needs in a longer-range context, with one of the recommendations dealing with the long-range. Any short-term solutions should be compatible with, and not run counter to, future long-term solutions. It is not the intent of this Chapter to examine each of the region's approximately 75 water utilities for distribution, plant, and storage details; rather it is the intent to examine the major supply deficiencies. The managers of the region's major water utilities and SCWA were contacted for their thoughts and opinions concerning alternative solutions.

From a long-term, regional viewpoint consolidation of some of these numerous water utilities to increase operating efficiencies and ease the problem of providing new sources of supply is desirable. Perhaps the 1974 Safe Drinking Water Act requirements for testing, reporting, and correcting problems will be the catalyst to move some systems toward consolidation. One of the long-term issues related to consolidation is whether or not present privately owned utilities should be acquired by public entities.

PHASE I OF 1970 WATER SUPPLY PLAN

Over the short-term period to 1985 it appears that Phase I of the 1970 Regional Water Supply Plan is no longer viable in its entirety. Demands have not increased in the manner predicted in 1970. Groton and New London are expected to need about 4 mgd by 1985 rather than the 9.5 mgd projected in 1970. Groton needs only untreated water and is therefore not interested in a treatment plant in Preston. New London is faced with constructing a treatment plant in Waterford for its system. It is unlikely that New London would also be willing to help finance a second treatment plant in Preston. The proposed Joe Clark Reservoir site is no longer undeveloped, with 10 houses now located in the area to be flooded. The Ledyard sanitary landfill is located within 500 feet of the proposed reservoir surface. The State Department of Health has indicated that a landfill is not desirable in a watershed of a public water supply. Costs of land, materials, and construction have risen so that a large capacity project costing $18 million is difficult, if not impossible, to sell locally because the cost for both the municipalities and the Water Authority must be supported by customers or the general population. There are no Connecticut or federal grant programs equivalent to the sewer program to finance such a major capital improvement. Perhaps the recent drought in western states or the Safe Drinking Water Act requirements for treatment plants will spur Congress to enact a grant program, but currently there is no assurance of this.

The purpose of the Joe Clark Reservoir was to provide a storage facility for the optimum utilization of the runoff from the Shewville Brook watershed. Although not needed for the short-term supply of this report, it, or a modification of it, could be considered in any long-term analysis of supply needs.

During the first 10 years of SCWA operations no major water user asked SCWA to expand its system or to build the above Phase I. In July, 1977, SCWA received

a request from New London to expand its water supply, and there is the possibility of other requests in the near future. The Water Authority cannot undertake a large capital project without a basis to support revenue bonds, which are its chief financial tool. Under its enabling legislation the Authority needs a request, customer base, and contract to guarantee payback of expenditures to conduct business. This also applies to planning studies. The Authority has no appropriated grant money available to it. In the past, uncertainty had evolved, with the municipalities reluctant to use the Authority because they felt it lacked experience or was too small to deal with their problems, while the Authority was limited by its enabling legislation to responding to requests from municipalities for new supplies. The Authority could not build a system on speculation and then have it waiting to go on line when the call came in. Hopefully, this uncertainty has now begun to decline.

Since major federal financial help appears to be far off and no severe drought has driven the municipalities together, perhaps a way to move forward would be initially to back-off from the approach of one major regional system and to consider a subregional approach. This is similar to the Regional Sewerage Plan and could still allow future connections on a regional scale. The logical subregions to begin with are the Groton and the New London areas which earlier were indicated as having the greatest short-term needs. These will be referred to as the Eastern and Western Subregions.

EASTERN SUBREGION

In the discussion of alternative new sources of supply presented in Chapter III it was noted that Eccleston Brook was not a favorable area for groundwater. Whitford/Williams Brook has a potential yield lower than that needed for the Groton system and would require six miles of piping. The Haley Brook proposal is close to the Groton system and has slightly less than the projected need but would require construction of about a 25-acre impoundment and increased storage capacity in Morgan Pond Reservoir. Its yield is not expandable so this would be a one-time expansion project.

A more viable approach in terms of yield is the Shewville Brook diversion which would pump water from Shewville Brook to the Billings Avery Brook diversion and thence into the Morgan Pond Reservoir which is part of the City of Groton system. This proposal would produce more than adequate yield which could be expanded in the future and would not require reservoir construction but rather could be stored in Morgan Pond by increasing its storage capacity.

An existing north-south power line right-of-way could reduce the transmission distance to 14,000 feet or less and would be multiple use of a right-of-way. This would also reduce the amount of roadways to be dug up and repaved, saving money and time. This route could also speed up the land acquisition-right-of-way problem since, hopefully, only the Connecticut Light and Power Company would be involved rather than individual land owners. This proposal would also be compatible with future connections on a regional scale, such as a western tie-in from Gales Ferry to Uncasville or an eastern tie-in with Mystic. As indicated in Chapter III, this Shewville system could possibly be expanded for long-term needs by adding Joe Clark Reservoir, a modification thereof, or the Broad Brook Reservoir.

The City of Groton, SCWA Eastern Division, and Mystic Valley District systems are all very close in the eastern section of Groton. It would be desirable to interconnect these systems for peak demand, safety-emergency, and low volume supply reasons. A catalyst to begin this connection could shortly be available. If the Town of Groton moves ahead with its industrial park plan, then a water main would extend from North Road (Route 117) to Flanders Road, the latter of which is adjacent to the SCWA Eastern Division. If these two systems could be interconnected it would then only require a short, second connection to join the Mystic Valley District system in the Mystic section of Groton.

The Mystic Valley District area is not calculated to need supplies for the short term of this report, but if commercial or residential growth in Stonington should increase rapidly, then new supplies would be needed sooner. If Shewville Brook were developed as indicated above, then this would leave the Whitford-Williams Brook aquifer for Mystic-Stonington use. The Mystic Valley District system could also be expanded by increasing the upper reservoir on Cobb's Brook or by utilizing the above connection with Groton in Mystic and moving Groton water east.

The Pawcatuck area of Stonington is located in the extreme eastern portion of this subregion. This area is served by the Water Division of the Westerly Public Works Department and accounts for about 25% of the system's revenue. A Westerly official has indicated that the increase in need indicated in Table 3 can be accommodated by the system's current supplies.

A major long-term source of supply for the Eastern Subregion is an aquifer in the Shunock River Valley in North Stonington with a projected yield of 10-11 mgd. This would be close to the northern end of the Pawcatuck load center, about 5-6 miles to the Mystic Valley District system and 10-11 miles to the Groton system.

WESTERN SUBREGION

The New London-Waterford system presents the largest short-term need in this subregion. The system has an average loss rate of 30% of the total supply pumped from Lake Konomoc.* The obvious step to increase supply is to initiate a leakage survey and reline and/or replace bad pipe. Current loss is 1.5 mgd. If this could be reduced to 10% of water pumped, then almost 1 mgd could be gained. A reduced loss percentage will be especially desirable when the treatment plant is completed so that the water is not treated and then lost. Also necessary for the system's safe yield is the full carrying capacity of the Barnes Reservoir to Konomoc Reservoir system. The Fay, Spofford and Thorndike report indicates that Beckwith Pond pumping station at this location is presently operating at 50 percent of its capacity. This could be due to biological growth in the supply main and should be corrected. In addition to the above, a water conservation program and new groundwater supplies should meet New London's short-term needs.

East Lyme is projected to have a surplus, but this groundwater comes from three aquifers, and so it is not at one "point" for piping to New London. Also, East Lyme has a high peak/average day demand ratio which should be considered in any future interconnections analysis. Since East Lyme is the fastest growing

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* Fay, Spofford, & Thorndike, Inc., Report on Water Supply, City of New London, May, 1977.

suburban town in the region, its Board of Water Commissioners would carefully examine any proposed sales to determine if peak summer demands could still be met.

Jordan-Nevins Brooks and Lakes Pond Brook (Speedbowl) aquifers in Waterford have a potential yield of 1.5-2.2 mgd and are adjacent to the current distribution mains, requiring no cross country pumping in mains. These groundwater alternatives were recommended by New London's consultant over the other alternatives discussed in Chapter III, which are located in Montville and Norwich. This groundwater, along with the leakage survey and correction program, conservation program, and the Barnes-Konomoc supply main correction are the recommended short-term actions for this subregion. New London's consultant has recommended that for the long term a reservoir be constructed on Hunt's Brook to augment the New London-Waterford system. These numerous possibilities indicate that there is need for a Montville, New London, Waterford, and Groton study and analysis beyond the short term.

Table 3 also indicated a projected need in Montville for the areas generally east of Route 52. This was based on an average of 95% of the population being served, which is probably a long- rather than a short-term need. Montville has had water quality problems in Uncasville and along Route 32 in the vicinity of Route 2A. Norwich currently has an excess of about 2 mgd available for perhaps 10 years. The City would probably sell this if suitable financial agreements could be arrived at. For the longer-term other sources would have to supplement this. Stony Brook Reservoir located in north-central Montville has a yield of 2.2 mgd and would be available from Norwich if financial terms were agreed upon. The water would have to be treated. The Trading Cove aquifer could also be a source, but a more useful choice might be the Oxoboxo groundwater, because in addition to serving different sections of Montville it could also augment New London's supply via Barnes Reservoir. If funding were available for a cross-river connection, then the Shewville system could be expanded if treated water were pumped from Groton to the west side of the Thames River.

OTHER AREAS

Colchester has an anticipated deficit by 1985. The Borough area is physically removed from the rest of the region so that it cannot be incorporated into one of the above schemes. Colchester's engineering consultant has recommended that for the short term new groundwater supplies be developed.*

The load centers of Baltic, Versailles, Jewett City and North Stonington are experiencing fairly slow growth rates and are projected to be within the indicated safe yields for the short term.

SUMMARY OF MAJOR RECOMMENDATIONS

1. Develop the Shewville Brook Diversion to meet the need indicated for the Groton load centers for the short term. Engineering and economic analysis should begin in the near future.

2. Initiate a leakage survey, correction program, conservation program, and develop Jordan-Nevins Brooks and Lakes Pond (Speedbowl) ground water

* Lenard Engineering, Water Supply Plan for the Borough of Colchester, Volume 2, March, 1975.

supplies to meet the need indicated for the New London-Waterford load centers for the short term.

3. For beyond the short term, initiate a Phase II engineering study that examines eastern and western subregion needs and possible solutions for Montville, New London, Waterford, and Groton.

4. Coordinated planning and development of new water supplies is important. In an effort to promote cooperation and understanding among the major systems it is recommended that the technical advisory board authorized in Section 4c of the act establishing the Southeastern Connecticut Water Authority be established.